The Northwestern MILLER

MILLING PRODUCTION SECTION

Experiments on Distributing Liquid Fumigants In Bulk Grains With Aeration Systems

By G. L. PHILLIPS

This report describes the results of tests to distribute liquid fumigants in bulk grain by the use of existing mechanical aeration systems at air flow rates used in cooling grain. Liquid fumigant mixtures are those which are liquid at normal temperatures and are not handled in pressure containers.

Three tests were made in grain elevator tanks at Danville, Ill., and Sterling and Garden City, Kansas. Four tests were made in large steel storage tanks at Neodesha, Kansas. Eight tests were conducted in upright steel tanks at Verden, Okla.

In the tests at Danville, Sterling, Garden City and Neodesha, evaluation of results was based upon gas analysis alone. In the tests at Verden, insect samples also were used.

Gas Sampling Technique

The procedure for placing gas sampling tubes was: In grain elevator tanks, the tubes were formed into cables and terminated at selected levels in the tank. Three or more cables were installed vertically in each tank before it was filled by anchoring them to existing vertical temperature cables or to ¼ in. steel cables installed for this purpose.

In the large steel tank and upright steel tank storage, probes were inserted from the top surface. At each selected sampling station, several probes were used, each one inserted to a different depth in the grain—for example, 1 to 10 ft., 1 to 20 ft., and 1 to 30 ft.

The concentrations of gas were determined with the thermal-conductivity gas analyzer. Since the instrument indicated the total gas present, and since no technique was available to separate the components of the fumigant mixtures, the readings are in terms of units on the galvanometer scale. These are valuable to indicate the comparative gas concentrations at the sampling points. It was realized that the ratio of the components could have been different than their proportion in the liquid mixture at any reading as a gas. Since this is a study on distribution, the galvanometer readings were considered to be a satisfactory criterion for evaluation.

The time pattern followed for sampling was ½, 2, 4, 8 and 24 hours. Subsequent sampling was dependent upon the type of test under way.

Samples of test insects were placed at two locations in the tanks at Verden, at the center and near one wall. At each location cages were placed above the grain (resting on the grain surface) and at depths of 2, 4 and 12 ft. The cages were placed in steel probes, and the probes were inserted to the desired depth. Granary weevil adults and immature stages, and flour beetle adults were used.

After fumigation, the insects were placed in clean cages and held for observation of mortality. Samples containing the immature stages of the granary weevil were held under optimum development conditions from four to six weeks to observe adult emergence, if any.

Grain Elevator Tanks

These tests were made to determine whether liquid fumigant mixtures could be applied by the recirculation and forced distribution methods.

Test H-1 was conducted in April, 1955, in the test elevator at Danville, which had been equipped with a recirculation system. In this test, the vapors were recirculated.

The tank was filled with shelled corn for this test, and the blower produced an air flow rate of 0.022 c.f.m./bu.

The fumigant used was one of the standard mixtures containing 29.2% ethylene dichloride, 63.6% carbon tetrachloride, and 7.2% ethylene dibromide, by weight. It was applied at the rate of 1.4 gal. per 1,000 bu. as a spray on the top surface, following which the blower was started and the vapors recirculated downward until readings on the gas analyzer indicated a fairly uniform distribution. The blower was operated one hour to accomplish this. At the 24, 48, 72 and 96-hour periods, the vapors were again recirculated by operating the blower for 40 min. each time. After the desired exposure

(Continued on page 10a)

ACKNOWLEDGEMENTS

The author is with the Stored Grain Insects Laboratory at Manhattan, Kansas, one of the field stations of the U.S. Department of Agriculture. The tests described were a cooperative endeavor with the Dow Chemical Co. and Michigan Chemical Corp. Acknowledgements are due C. S. Bulger and W. Keith Whitney of the laboratory staff for assistance in some of the tests; to G. L. Kline and Harry Converse, engineers with the USDA Manhattan field office; to R. L. Parker, entomologist with the Lauhoff Grain Co., for assistance in the tests made at Danville, Ill.; and to members of the technical and field staffs of the cooperating companies. Sites were made available for the tests by the Lauhoff Grain Co., Danville; Farmers Union Cooperative Elevator, Sterling, Kansas; Garden City Cooperative Equity Exchange, Garden City, Kansas; Moore-Stauffer Co., Verden, Okla.; and Emergency Grain Storage Co., Neodesha, Kansas.

Sample location and number	Galvanometer readings following recirculation				Galvanometer readings before and after redistribution							
					24 hours		48 hours		72 hours		96 hours	
	½ hour	2 hours	4 hours	8 hours	before	after	before	after	before	after	before	after
	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units	Units
Headspace												
1. Above load	5	4	3	3	7	10	6	10	3	10	6	6
15 feet deep												
2. North wall	2	4	4	4	6	6	0	2	0	2	2	2
3. Center	7	5	4	6	4	18	5	7	10	8	8	6
4. South wall	3	2	4	2	1	12	1	4	3	2	3	1
35 feet deep												
5. North wall	1	2	2	2	0	4	2	2	2	4	2	3
6. Center	10	7	8	8	8	19	10	12	18	10	10	6
7. South wall	2	2	2	3	2	10	2	4	3	4	2	2
55 feet deep												
8. North wall	2	2	2	3	3	4	2	3	3	4	2	2
9. Center	14	12	12	14	10	30	14	15	16	16	12	10
10. South wall	3	2	3	3	2	8	2	3	2	4	2	2
75 feet deep												
11. North wall	3	4	4	4	4	5	5	6	4	6	3	4
12. Center	16	10	10	19	14	24	17	17	12	20	16	9
13. South wall	10	6	6	6	4	10	5	5	4	4	2	3
95 feet deep												
14. North wall[1/]	7	9	10	12	11	12	12	14	10	10	5	5
15. Center[1/]	46	42	42	42	34	33	23	24	20	16	18	12
16. South wall	10	8	8	7	5	14	5	7	5	7	9	6
115 feet deep												
17. North wall	24	23	20	15	15	11	15	15	10	10	10	6
18. Center[1/]	82	83	87	55	55	64	42	28	20	20	20	12
19. South wall[1/]	10	10	12	34	34	16	16	12	10	10	8	6
20. Hopper	16	16	12	2	2	8	5	8	2	6	8	4

1/Sample tubes Nos. 14, 15, 18, and 19 were broken so the exact location of these samples is not known.

TABLE 1—Distribution of the vapors of a liquid fumigant in an elevator tank of shelled corn resultingfrom recirculation for one hour with an air flow rate of 0.022 c.f.m./bu., and subsequent redistribution each 24 hours by operating the blower in reversed position for 40 minutes.

Sample location and number	Galvanometer readings following the initial distribution							
	½ hour	2 hours	4 hours	8 hours	24 hours	48 hours	72 hours	96 hours
	Units	Units	Units	Units	Units	Units	Units	Units
North side								
1. Above load	24	20	24	18	9	10	4	3
2. 11 feet deep	40	82	120	85	76	64	58	56
3. 29 feet deep	44	75	124	80	82	60	54	52
4. 47 feet deep	104	85	104	116	64	54	47	46
5. 65 feet deep	70	66	70	120	56	38	14	26
6. 83 feet deep	50	31	32	90	72	34	13	20
7. 101 feet deep	36	4	4	20	65	38	14	2
Center								
8. Above load	31	64	78	86	62	37	32	32
9. 11 feet deep	72	86	104	70	74	56	56	52
10. 29 feet deep	80	86	84	90	78	56	50	52
11. 47 feet deep	68	86	78	68	68	48	47	43
12. 65 feet deep	108	84	96	46	43	55	48	42
13. 83 feet deep	86	80	80	60	50	51	46	18
14. 101 feet deep	0	0	0	6	43	42	0	3
South side								
15. Above load	34	68	80	44	66	48	48	48
16. 11 feet deep	24	35	40	64	76	38	40	38
17. 29 feet deep	46	50	54	62	54	43	43	42
18. 47 feet deep	64	64	62	84	54	40	42	35
19 65 feet deep	70	70	70	90	60	42	38	32
20. 83 feet deep	60	24	26	58	46	32	18	13
21. 101 feet deep	4	4	0	4	48	0	0	2

TABLE 2—Distribution of the vapors of a liquid fumigant in an elevator tank of wheat resulting from distribution by operating the aeration blower for 14 minutes at an air flow rate of 0.04 c.f.m./bu. in order to distribute the vapors from top to bottom of the tank.

world-renowned for...

GREATER PRODUCTION
LOWER MAINTENANCE
LESS DOWNTIME

Engineers for Industry Since 1860

BUHLER 4 Roller MILL

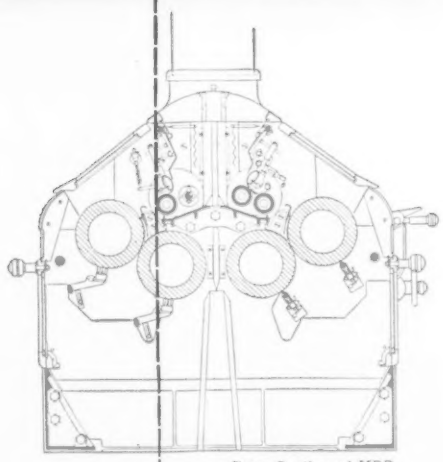
Performance with more than 70,000 units throughout the world gives strong evidence that Buhler 4-Roller Mills can increase your production, cut your maintenance costs and reduce downtime.

Millers everywhere recognize the *"Buhler"* as the world's best roller mill for flour milling. Many automatic and advanced features provide outstanding advantages. And you get a beautiful piece of machinery that is a credit to the appearance of any mill.

It's a stronger, more streamlined, more compact mill. A Buhler 10" x 40" mill occupies the same space as a conventional 9" x 36"— provides 10% more capacity in the same floor area.

The *"Buhler"* is infestation-proof — no spots for insects to breed. High quality rolls insure even grinding, higher extraction, and greater capacity. Simple, uniform, double-roll UNIC feeder is automatic. Feed rolls and grinding rolls are interlocked.

Self-aligning, U. S. Standard roller bearings permit higher speeds, greater capacity, and save up to 20% power as against sleeve bearings. No need to replace gears when roll diameter decreases due to special conical gears.



Cross-Section of MDD

OPTIONAL FEATURES

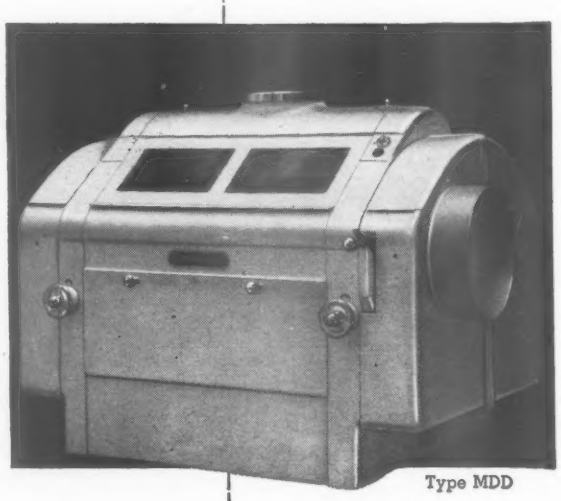
Automatic engaging and disengaging of the grinding rolls by pneumatic means to protect rolls.

Choice of chain drive instead of gear drive.

Water-cooled grinding rolls for better flour extraction and uniform grinding.

4-speed regulator for feed rolls.

Learn how the roller mill that has contributed so much to the progress of flour milling throughout the world can make more money for you. Write for full details.



Type MDD

BUHLER BROTHERS, INC. U.S.A.

BUHLER BROTHERS (Canada) LTD.

SPROUT, WALDRON & CO., INC.

Engineers for Industry Since 1860

477

Pulverizer People Put Pep In Program

Machinery Company Tires of Dull, Costly Sales Meetings; Streamlines Procedure

How good is a good sales conference?

After lengthy study and some superb planning, the Prater Pulverizer Co., Chicago, has come up with a peppy, informative and entertaining method of doing the time-worn chore of revitalizing sales personnel, distributors and dealers, without wearing them out.

For a long time executives of the Prater Co. suspected that something was lacking in the whole field of annual sales conferences, not just those of their own firm. As with other companies, they sensed an attitude each year of, "Oh, heck, it's that time again—let's get it over with, have a little fun and get back home to the daily grind!"

The Prater people decided to do something about it. They proceeded on the theory that the old, time-honored system was very costly to the company and tiresome to the sales force when balanced against results.

So, when Prater's annual conference opened in Chicago recently, it displayed considerable face-lifting and a complete change of format. Long weeks of careful planning went into making a three-day conference into a serious—but not too serious — information-packed "college of knowledge" that was also entertaining and satisfying.

The Prater Co. revitalized its sales conference along several major lines: Registration was speedy, speeches and lectures were in capsule form, but well planned (making room for covering more subjects), and salesmen were made to feel that the trip to the home office was really worthwhile, that they were being brought up-to-date on their company's products and methods.

Two days of the 1956 Prater conference were conducted at the Oak Park Arms Hotel, Oak Park, Ill., and the final day was spent at the company plant.

Every salesman, distributor and dealer knew it was "back to school" when he was issued a blue and orange Prater cap at registration, along with a carefully planned schedule. The schedule was titled "Prater's College of Feed Technology," G. F. Thomas, dean of the faculty, and W. F. Earl, dean of men.

Promptness and precision were given considerable credit for the success of the meetings.

On the opening day, the student body was impressed with the seriousness of the work by an invocation. It was followed promptly at 9:05 a.m. with a welcome by Mr. Thomas, president of the company. Prater caps were immediately distributed. At 9:15 a.m. a 30-min. entrance examination was given to determine how well versed the salesmen were in the fundamental facts of Prater advanced custom mills and spiral mixers, which prospective customers want to weigh against other equipment before buying.

The examination was followed by 15-min. lectures by Prater engineers about their advanced custom mill, modern merchandising, selling mixers, parts, money matters, shipping instructions, and related subjects.

There was a discussion by the faculty and students about "The Trend Toward Bulk Handling in the Custom Mill." It was climaxed by a final examination containing 21 difficult questions. But before the exam, Mr. Earl reviewed the main points of the lectures.

The first evening was finished with a social hour and showing of travel motion pictures.

Promptness was again the keynote when the second day opened. The invocation was followed by taking of photographs. Then President Thomas and other speakers took over. They covered subjects from customer demand, competition, trends in milling and distribution to metal alloys, hardening processes, automation, research, credit extension, merchandising, publicity, advertising and profits.

"Millers appreciate a trained sales force, that is the reason for this 'college course'," said Mr. Thomas. He told of plans to put a Prater station wagon equipped with a model custom mill on tour to help sales in 1957.

By way of rebuttal, salesmen were given plenty of time to question a panel of company specialists about mills, products, useage and techniques.

As with most sales conferences, the "Prater college" climaxed its work with an annual banquet. But Prater went a step farther and awarded diplomas, and selected a valedictorian.

The course was shot through with interesting changes of pace. At one point Paul McKamy, secretary of the company, accompanied a lecture on the ways that Prater equipment is used with magic tricks.

The final day brought the student body to the company's plant, where there was an inspection of the shop, a demonstration of hardening of mill hammers and unveiling of a new "surprise package" fully automatic custom mill unit.

And, finally, there was an open discussion which permitted each representative to air his problems.

GRAIN STORAGE REPORT ISSUED

Grain storage is discussed in a new bulletin published by the Great Plains Agricultural Council. The bulletin points out that in the 10 years 1943 to 1952 the average annual production of grain in North Dakota and six other northern great plains states was about 1½ billion bushels, one-fourth of the 6 billion bushels grown in the U.S.

The report covers storage related to the environment of the northern great plains, on-the-farm grain storage, storage by commercial companies, and grain storage and public policy.

McCabe Co. Makes Major Expansions

MINNEAPOLIS — The year 1956 was one of the big years in physical plant expansion for the McCabe Co., company officials pointed out recently in a report in the firm's monthly publication.

New feed milling facilities were installed at some of the company's locations in the Northwest, and its storage facilities were increased by 430,000 bu.

The grain and feed firm installed a new feed mill at Lowry, Minn. The installation includes new grinding and mixing machinery. The two mixers are equipped so that either mill can grind into either mixer. New bulk ingredient storage bins and bulk load-out bins are part of the installation.

At Belview, Minn., also, a new feed mill, including grinding and mixing equipment, was installed. At Forsyth, Mont., the company installed a steam rolling mill for rolling oats and barley for cattle ranchers. A molasses tank and other new facilities were added at Glendive, Mont. Corn dryers were installed at other locations.

Elevator annexes were built at several points in Montana and Minnesota to increase storage space.

Total expenditures for capital improvements amounted to more than $400,000.

SALESMEN OF THE YEAR—A highlight of the recent Prater Pulverizer Co.'s "College of Feed Technology" was the awarding of "Salesmen of the Year" trophies. Award winners were Howard Bauman, at the left, and Dave Lingard, at the right. With them is George F. Thomas, president.

How to Handle Situation When Worker Asks Raise

A quick brush-off of a worker who asks for a raise usually leads to a low morale, spotty production and smoldering grievances.

That's because the family finances are a touchy matter in these days of high prices—and in most cases the Missus won't let her husband forget.

Dipping into the fine points of a raise interview the handling of a worker in the right way usually:

- Makes the worker feel better. He gets a chance to blow off steam and justify himself in the eyes of his wife.
- Brings out any "sleeping discontent" early—before it becomes a production drag on the worker's mind.
- Gives you a clue to what may be wrong in the mill.

Some Preliminary Steps: But even before the worker pops the fatal question, there are these pointers to bear in mind:

- Try and anticipate a worker's request for a raise. You can do this best by keeping close contact with each man via personal chats.
- If, in your talks, you think you spot something bothering a worker call him in and ask him point blank what the trouble is.

How to Handle the Interview: When a worker asks you for a raise, use the following checklist:

- First, take him where it's private. Ease the tension by being friendly and sympathetic. Remember: It's a hard thing for a worker to get enough nerve in hand to talk money.
- Once the question is "before the house," don't stall, get vague, or change the subject. So that you can size up the facts and gauge what approach to take, try asking some leading questions such as these:

Question Chart: 1. Why does he want a raise now? 2. Why does he think he is entitled to a raise? Is it because of his performance? Because somebody else got a raise, or what? 3. Does he know company promotion-and-wage policy? 4. Does he think raises are given unfairly? 5. Does he have a pressing financial problem? 6. What does he think a raise will accomplish, if it is given now? 7. Has he been satisfied with his job and progress in the firm? His treatment? 8. Does he measure his job entirely in terms of money, or are there other important factors?

How to Say "No": Obviously the hardest job in handling a raise minded worker is—how to turn him down. Here's a little blueprint to cover the situation:

- Review company policy on wages and promotions. Be sure to correct any twisted thinking.
- Have your records on the worker handy. See that they are up to date. Go over his performance with him, pointing out his strong and weak points.
- Follow with a presentation of other reasons why he can't have the raise he wants—at this time. However, tell him that he's free to take the problem up with you again any time he wishes.
- To bring him down to earth, compare his general situation with that of some of the other workers—without mentioning names, of course.
- Talk in terms of long range security and explain the company's viewpoint. Show him why there has to be a regular wage schedule.

GIVING THE MILLER WHAT HE WANTS

New mills for old

This Sasko mill at Ficksburg was recently stripped, re-floored, and given a "Pneu-Flow" conveying system. Output soared, although almost all the original machinery was re-installed.

In recent years Robinsons have been called upon to undertake many remodels. Their latest machines and their unique "Pneu-Flow" and "Pneu-Spout" methods of conveying provide the exact answers to modern requirements.

Robinsons are realists; they are never above re-using efficient machinery and equipment to save capital expenditure. The Robinson organization is flexible enough to tackle and solve all remodel problems however complex. And most important, the job is finished on time.

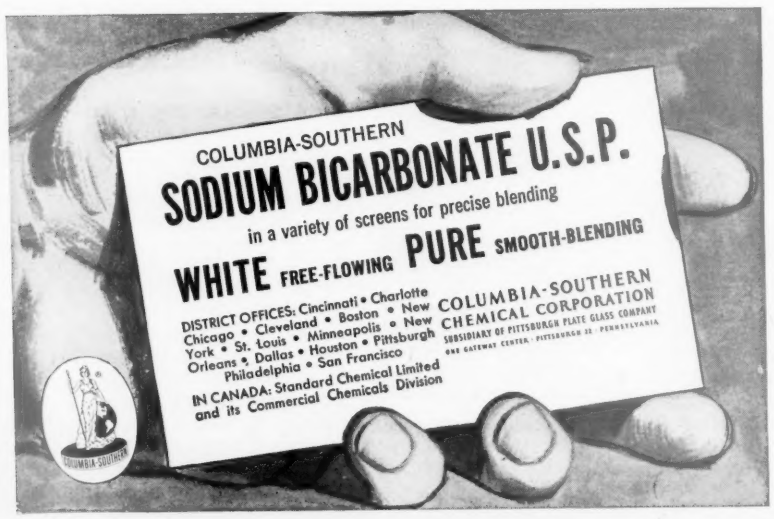
Robinson OF ROCHDALE

THOMAS ROBINSON & SON LTD., ROCHDALE, ENGLAND

Resident Representative in U.S.A.: MICHAEL FANNING,
c/o Oak Grove Hotel, 230 Oak Grove, Minneapolis, Minn.

In Canada:
KIPP KELLY LTD., 68 Higgins Avenue, Winnipeg, Manitoba, *Telephone* 92-2507

JONES-HETTELSATER CONSTRUCTION CO.
Designers and Builders for Milling Companies
1911 Baltimore Ave. KANSAS CITY 6, MISSOURI


COLUMBIA-SOUTHERN
SODIUM BICARBONATE U.S.P.
in a variety of screens for precise blending
WHITE FREE-FLOWING PURE SMOOTH-BLENDING
DISTRICT OFFICES: Cincinnati • Charlotte Chicago • Cleveland • Boston • New York • St. Louis • Minneapolis • Pittsburgh Orleans • Dallas • Houston • Philadelphia • San Francisco
IN CANADA: Standard Chemical Limited and its Commercial Chemicals Division
COLUMBIA-SOUTHERN CHEMICAL CORPORATION
SUBSIDIARY OF PITTSBURGH PLATE GLASS COMPANY
ONE GATEWAY CENTER, PITTSBURGH 22, PENNSYLVANIA

Sound Waves Used to Unbridge Bins

Sound waves are coming into wider use for breaking loose ingredients which have bridged in bins.

An air-operated sonic generator, attached to a bin, sets up sound waves which vibrate the material and thus unbridge the bin.

Lee Chambers, chief engineer of the Albers Milling Co., Los Angeles, told about the use of sonic vibration at a meeting in Kansas City.

Mr. Chambers first noted that various devices or methods have been used to unbridge bins, including, of course, the hammer. Among other systems which he mentioned were pneumatic and electric vibrators on hoppers, chain devices and rubber boots or blisters that are inflated with air, and sound waves.

There are limitations with any method, he indicated, but sound waves have done a job where vibrators have failed. Vibrators, he said, will work if material is in contact with the bottom. Devices which are inflated inside the bin won't work if the material is highly densed.

Particles Vibrated

Mr. Chambers explained how a sonic generator can be installed on a hopper at the bottom. The waves work toward the bridge through the cavity and vibrate the particles of material so that the bridge breaks. (See the accompanying diagram.)

The sonic generator also has been used on the top of bins if the cavity runs all the way through the bin, Mr. Chambers noted. The waves go through the opening in the bin cover.

Another use is in leveling material from the top of a bin before new material is added, keeping the material from becoming packed to the bin sides and spoiling.

The device described by Mr. Chambers is called the "Sonic Flo" and is made by the J C L Engineering Co., Los Angeles.

It is said to work on most ingredients but will not take care of the problem with all ingredients, Mr. Chambers said. It is not effective on beet pulp because the sonic waves are absorbed in the interweaving strands without setting up a vibration.

If bridging is high up, Mr. Chambers said, other waves may come back and nullify the effect. But if the device is run in cycles, you do not get the nullifying effect.

Another application of the sonic generator is the use of a portable unit on hopper cars.

The use of sound waves is new, Mr. Chambers said, but they will find greater use in various ways. For one thing, sonic waves can be used to precipitate dust.

In answer to questions, Mr. Chambers explained that the sonic generator is air-operated with 50 to 100 lb. of pressure. An opening in the bin is made, and it is attached to the bin.

Also, he said, it can be dropped inside a bin.

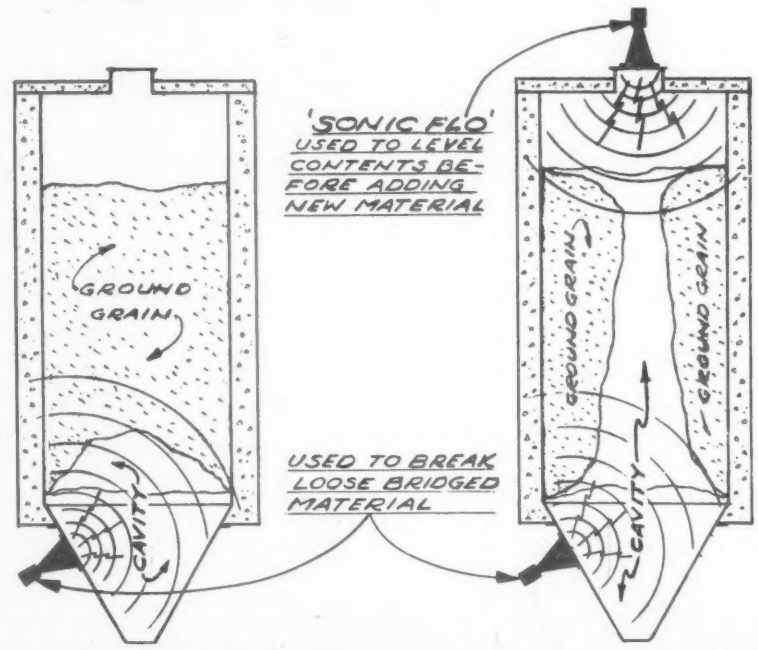
There is no evidence of weakening of the bin structure by the sonic vibration, Mr. Chambers said. He noted that the device is used only if materials hang up and a cavity is created.

An example of the use of the "Sonic Flo" was in unbridging a concrete bin 12 ft. square and 100 ft. high containing millrun at the Albers mill in Oakland, Cal. The bin was bridged 20 ft. above the bottom. After two men had worked several hours poking the material through an opening in the hopper with a length of pipe, sonic waves were introduced through the opening, and the millrun broke loose in three seconds.

The device will work on concrete, metal or wood bins. It is designed to vibrate each particle of material, causing it to break loose. Also, it is said, it will emit waves up through a bin itself without damaging the bin. This oscillates the bin and aids in unbridging. The system will not unbridge material that is extremely solidly packed, but it is said that it will work on most materials.

With an opening in the bin, the sonic generator is attached to the bin, as indicated in the diagram. With bin attachments and slide gates, the device may be moved from one bin to another. When it is installed permanently on one bin, no bin attachment is necessary. When used with a level-indicating device and a solenoid valve, the unit will operate automatically.

The "Sonic Flo" is made of cast aluminum. The open end is 8½ in. square, and the over-all length is 13½ in. Mr. Chambers said that the price of the sonic generator is $160, and the cost of the bin attachment is $20.



Sound waves are used to unbridge materials in concrete, wood or metal bins.

Modern Production Methods In the Semolina Mill

EDITOR'S NOTE: This article, written by R. Lange, a European technologist, has been translated from the German milling publication, Die Muhle.

While the reduction passages in a hard wheat semolina mill have a similar significance to those in a soft wheat flour mill the operation and the flow scheme of a hard wheat semolina reduction system are quite different.

As a regular rule, even though the quality of the raw material is not subject to great fluctuations as is often the case with soft wheat varieties, the reduction system—and not that alone, but the entire diagram—must be sufficiently flexible. This is not because of different wheat types with different structures, but because of the demand for accurate grading to a given fineness of the particles of semolina and dunst. This restriction of the particle size to predetermined limits is more important today than in the past.

Modern macaroni plants work mostly with automatic presses, in which both the preparation of the dough and the subsequent forcing of it through the dies are carried on in cycles without any interruption. The processing time for the dough is thus considerably shorter than it was under the old system, in which the raw material was mixed with the appropriate amount of water and then kneaded on a roller kneading machine, until such time as the mass was homogeneous and ready to be sent to the roller press for rolling out.

Here it was rolled into the required thickness and then cut up into the various finished product forms. In the manufacture of macaroni and spaghetti, the mass of kneaded dough was delivered to the pressure cylinder, one end of which was closed by the die. This system of manufacture is still to be found today, although the majority of producers use the rapid automatic press. In the old system, the process from the preparation of the dough to the finished cut or pressed products took at least thirty minutes, and often longer. With modern machines it is completed in between five and fifteen minutes. It can thus be clearly seen that different characteristics will be required of the raw materials.

An important characteristic is granularity, which should be as uniform as possible. The drying of the finished products presents problems, also. At the present time, manufacturers are very much concerned with making the drying time as short as possible, in order to keep costs low. In a well-worked, fine-grained dough mass the tensions created by a too rapid drying process do not arise so readily as they do when the granules are coarse.

It is part of the work of a semolina mill to extract from the hard wheats available a high percentage of good quality semolinas. Flour is undesirable and the amount of it produced should be kept as low as possible. The coarse semolinas resulting from the breaks and head reductions have thus to be reduced to the requisite fineness; this must be done carefully and without producing flour. In hard wheat mills of earlier times only those semolina particles with bits of bran adhering to them were sent to the reductions; the clean stocks were sent for sacking-off straight away, because coarser semolinas were greatly in demand and commanded a high price. In this connection modern mills are rather at a disadvantage, because even the clean coarser semolinas, of a granularity no longer required, have to be reduced to dunst, and this cannot be done entirely without making flour.

Adaptability Needed

Last but not least are those mills that have to deal with both durum and soft wheats at different times on the same system. An adaptability to both types of wheat is demanded from the diagram they use.

The reductions' job in a hard wheat semolina mill is first of all the production of good quality semolinas and dunsts from the break stock. Semolinas and dunsts that do not meet the requirements so far as quality and cleanness are concerned are sent to one of the reduction passages. The divisions are made according to granularity and color. Separate reductions for coarse and fine stocks are essential for a good extraction, since in order to keep the production of flour as low as possible the rolls have to be set as wide as possible. In each passage between a pair of rolls the particle size is only slightly reduced and the stock is classified again afterwards. This pronounced high milling leads to a number of recirculations of stock

Some of those groceries would be as out of date today as the rumble seat itself! As you know, new processing methods, new packaging, new ingredients have changed many food products.

Even staples like family flour have been improved, thanks to vitamin enrichment. Today, food buyers *expect* food products to carry the "ENRICHED LABEL".

Twenty years ago, just about the time the rumble seat was on its way out, mass production of vitamins was just getting underway. One of the first companies to master the techniques of manufacturing quality vitamins was Chas. Pfizer & Co., Inc.

Since the middle 1930's Pfizer has continually been a leader in developing new and better forms of vitamins for the food and pharmaceutical industries. Pfizer BI-CAP® was one of the first enrichment concentrates. And this "head start" in vitamins has continued. It means that Pfizer can help you with the newest developments in enrichment products.

PFIZER BI-CAP has recently been improved through vitamin research. It is now a lighter color enrichment mixture with an even dispersion that overcomes unsightly agglomeration. All three forms of BI-CAP are also made with thiamine mononitrate for Better Vitamin B_1 stability.

Continued Pfizer research in riboflavin, thiamine and other nutritional additives such as amino acids will help you offer improved flour for tomorrow's improved bread and baked goods. Look to Pfizer for the finest enrichment concentrates.

CHAS. PFIZER & CO., INC., Chemical Sales Division, 630 Flushing Ave., Brooklyn 6, N. Y.
Branch Offices: Chicago, Ill.; San Francisco, Calif.; Vernon, Calif.; Atlanta, Ga.; Dallas, Tex.

PIONEER AND LEADING MANUFACTURER OF VITAMINS

Pfizer

in the reduction and classifying systems, which have to be taken into account.

These recirculations, if they are properly controlled and managed, need not have any adverse effect on quality or production capacity, since it is for this reason that the feeds to the classifying system are so carefully arranged; only clean products join the purified stock.

The recirculations, which have such a bad reputation in soft wheat mills, are in fact necessary in semolina milling in order to keep the number of machines required from getting too big: it may not always be possible to use enough short lengths of roll surface instead of allowing the stock to recirculate. This applies not only to small and medium sized plants, but even to big mills, which use the system with success. It is essential to use the repeated classifications and the chance they give of separating out smaller amounts of stock and sending them to other runs specially provided for the purpose. Thus it is that the hard wheat mill is in a position to mill high at settings that in a flour mill would be regarded as extreme, in order to produce the required granularity without lowering the amount of usable stock produced.

The lower reductions are employed only for grinding, since they receive only dunsts that it would be profitless to purify any further—fine stock that is well mixed with bran powder. Coarse material, even when it is heavily contaminated with bran powder, continues to be carefully reduced until it becomes obvious that no more purifiable stock is to be expected from it. Only then do these stocks leave the reduction system in order to go to the wheat-feed grinders, the bran rolls or the flour reduction rolls. Thus the reductions are operated either directly or indirectly in conjunction with purifiers.

The reductions have a further significance. A finer, more regular granularity is preferred today. In order to reduce the coarse stocks, which have been separated out as clean, purified semolina, a number of special reduction rolls are provided so that there is no danger of these stocks becoming mixed with those from lower down the mill. The number of these so-called dunst reductions depends on the capacity of the mill and on the type of product in demand. In certain cases it may turn out that there are as many as six dunst reductions. Rolls for this purpose are usually corrugated. The diagram is extraordinarily comprehensive and flexible enough to carry out all the tasks that a semolina mill may be called on to do.

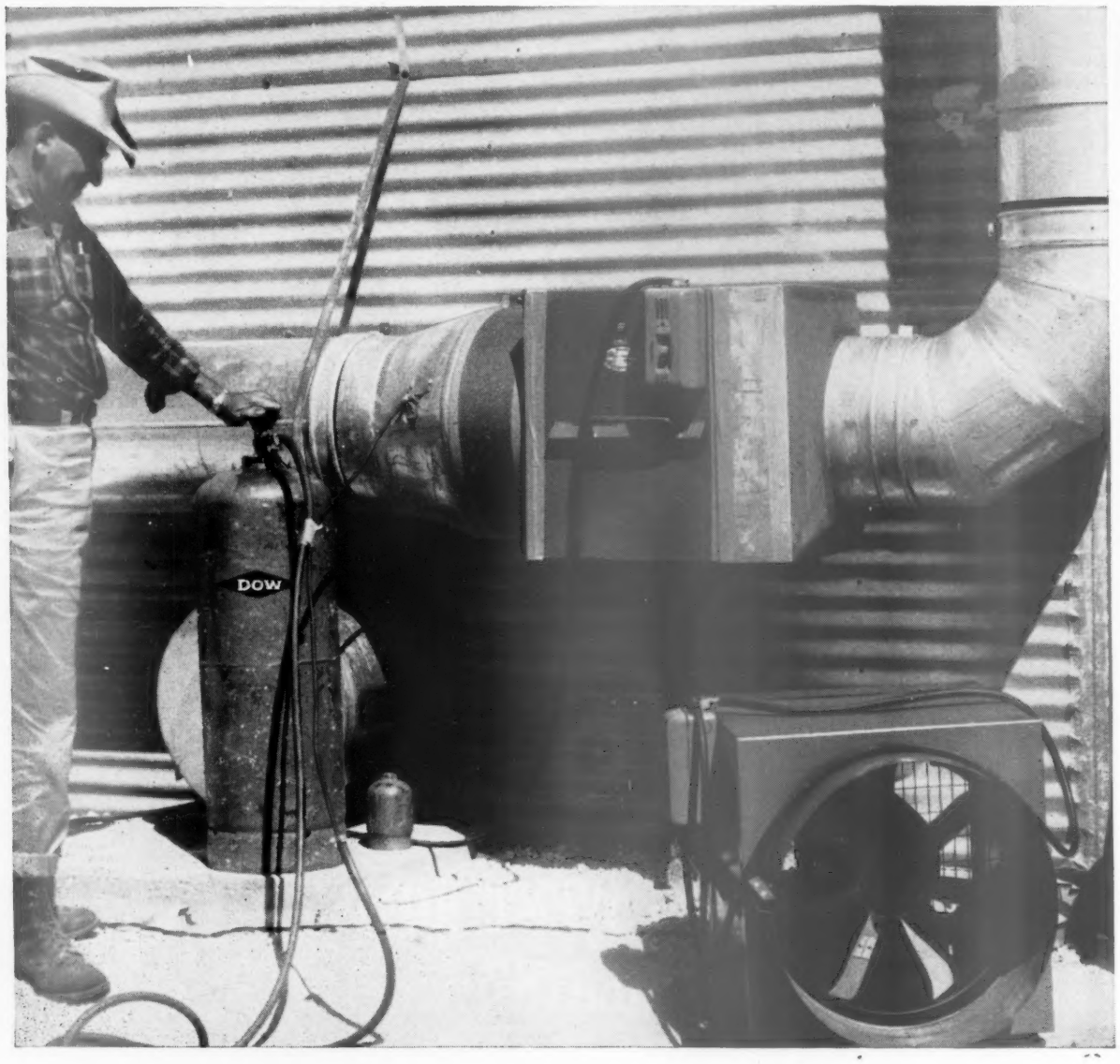
John A. Robertshaw, Jr.

VICE PRESIDENT—John A. Robertshaw, Jr., has been elected a vice president of Robertshaw-Fulton Controls Co. Mr. Robertshaw, a grandson of one of the founders, has been associated with Robertshaw since his school days, working in plant and office jobs during off hours and vacations. He has been in charge of foreign operations since 1952, and was made an assistant vice president in 1954.

This is usually higher in a hard wheat semolina mill than in a flour mill, for reasons described in the last paragraph. Since modern mills, as a result of the developments on milling machinery, are not only externally different from those of 40 years ago but have also undergone some simplification of the processes involved, the two systems should be considered separately.

A great step forward was the introduction of the modern purifier, even though the system of purification remained the same. Simpler ways of arranging stock runs have been developed, which have led in part to new methods of handling and simplification of the diagram. Finally there is the circumstance that the demand is only for finer semolinas, so that the hoped-for shortening of the reduction roll surface has not been realized. We can say that the number of reduction roll passages in the two systems is not more different than the difference between the demands made on the two systems required.

Under the old battery system there were in round figures for each double purifier one reduction passage —or alternatively, one reduction for



Recirculation of Dow Methyl Bromide for

fumigation with measured safety and results

In fumigating bulk commodities, the natural advantages of Dow Methyl Bromide are used to best effect when applied by the forced air recirculation method.

This method of fumigating with methyl bromide makes an exact science of fumigation. It results in quick and uniform distribution of the fumigant in the grain mass, thereby assuring complete control of the insects.

You can save up to 50 percent in fumigant costs by recirculation because dosages are lower—fumigant distribution is better. Your present aerating system can probably be adapted to this improved fumigation process.

Fast-acting, Dow Methyl Bromide is also a superior fumigant for other uses such as vault, tarpaulin and box car, as well as building fumigation.

Write for further information on the recirculation process. Fumigant Sales Section, THE DOW CHEMICAL COMPANY, Midland, Michigan.

YOU CAN DEPEND ON DOW

each purification battery. In recently built mills using purifiers with several decks of sieves, there is provided one reduction for each double machine or for every three purifier sections.

Number of Reductions

The lowest permissible number of reductions should be at least four, in order to allow for a satisfactory classification. We should need more than seven or eight, under normal circumstances, in very few mills. While the number of reduction passages is very closely related to the number of purifier sections, the number of sifter sections depends on the capacity of the mill and is not closely related to the number of reductions.

In hard wheat semolina mills, corrugated rolls are always preferred for the reductions. When they are properly set—in such mills this is invariably high—they give a lower flour production and sharp, lively dunsts of regular granularity. The effects can be better regulated by roll adjustment than with smooth rolls, in which flour production cannot be well regulated from outside and which produce irregularly sized particles even when set high. Finally, a great deal depends on the wheat, which as a rule is so hard that it tends not to produce flour. There are reductions that are equipped with smooth rolls, and they work with particular success on dunsts with high ash contents.

These rolls have a particularly rough surface (heavily "frosted" or even ground with sand). In the lower passages, where finer granularity is required, corrugated rolls are not used. For coarser granularity corrugated rolls are to be preferred because of the greater regularity of the products.

For the reductions, roll surface is so calculated that the greatest regularity of feed is assured. With a fixed speed, the normal weight of feed must be exactly half way between the highest and lowest possible feed rates that can be expected.

Under the old system, the reductions have a specific length of roll surface of 17 mm per 200 kilos of wheat per 24 hours, on the average. They are divided as follows:

Reduction No.	Percentage of total reduction roll surface	Specific roll surface per 200 kg. wheat/ 24 hours
1	18	3.2 mm
2	18	3.2 mm
3	14	2.5 mm
4	14	2.5 mm
5	10	1.8 mm
6	10	1.8 mm
7	8	1.4 mm
8	8	1.4 mm
	100%	17.8 mm

This is for a normal feed of 23 kilos per 10 cm. (4 in.) an hour, at a roll speed of 300 r.p.m. (fast roll). Roll diameters 220 mm (9 in.).

The relationship between break and reduction roll surface under this system is in the ratio 1-0.9.

In modern hard wheat semolina mills in Europe the amounts of roll surface are slightly less than those of the old system. A specific roll surface of 13 mm per 200 kilos of mill capacity per 24 hours may be regarded as the minimum, and can only be used where the coarser semolinas are in favor. Where they are not, that is where dunsts are preferred, a specific surface of 17 mm per 200 kilos per 24 hours is needed, and this figure may be regarded as the maximum.

One of the most modern semolina mills may be taken as an example. It is very reminiscent of the old system, particularly in its purifier battery system. The specific roll surface for the reductions is 18 mm per 200 kilos/24 hours. This figure is theoretical, since not all the passages are in use at the same time. According to requirements there are usually two or three pairs of reduction rolls out of use, so that in fact a specific roll surface of 14-15 mm/ 200 kilos/24 hours is used.

The distribution of roll surface in a modern diagram is therefore as follows:

Reduction No.	—a— mm/200 kilos/ 24 hours		—b— mm/200 kilos/ 24 hours	
1	22%	3.3	16%	2.2
2	22%	3.3	18%	2.5
3	17%	2.6	18%	2.5
4	13%	2	14%	1.9
5	13%	2	10%	1.4
6	13%	2	10%	1.4
(7)	—	—	7%	1
(8)	—	—	7%	1
	100%	15.2	100%	13.9

The normal feed is:

(a) on fluted rolls (9 in. diameter) running at 300 r.p.m. (fast roll) 30 kilos per 10 cm. per 24 hours.

(b) on smooth rolls (10 in. diameter) running at 220 r.p.m. (fast roll) 20 kilos per 10 cm. 24 hours.

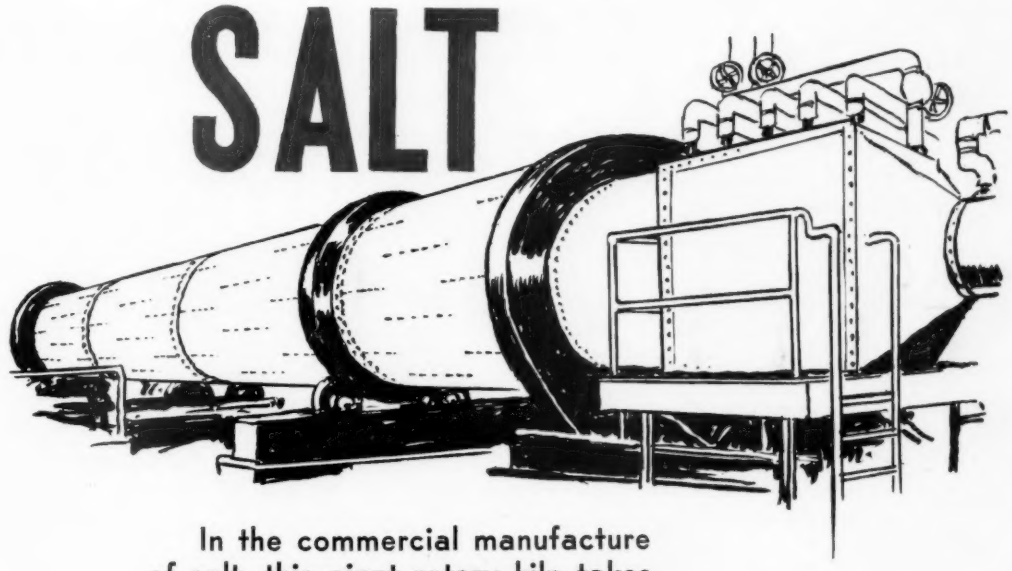
The reduction roll surface is thus generously calculated, as is necessary for carefully regulated reductions in order to avoid building up a cushion of stock between the rolls as this causes the particles to be crushed and more flour to be produced. Each particle of stock should come into contact with the rolls even though these themselves are not moving. The reduction stock should come from between the rolls in a thin, curtain-like stream.

The relationship between break

CANADIAN WHEAT CARRYOVER

OTTAWA—Official figures indicate that Canada may finish the current crop year on July 31, 1957, with a record surplus of more than 600 million bushels of wheat. Grain traders believe that this estimate is too low and suggest that the actual carryover will be more than officials estimate.

SALT



In the commercial manufacture of salt, this giant rotary kiln takes care of removing any remaining moisture in the almost finished product . . . there remains, you guessed it, the sifting. For the finer grades which must be uniform in grade and texture, SWISS SILK bolting cloth is used.

The salt refiner, like the miller, has found that only the best sifting cloth is reliable, durable and altogether efficient for the modern day manufacture of finely ground products. SWISS SILK is proud to be recognized as the chief supplier of fine sifting textiles the world around.

BODMER
DUFOUR
EXCELSIOR
NITEX
SCHINDLER
WYDLER

GENUINE Swiss Silk

THE WORLD'S FINEST SIFTING TEXTILE

and reduction rolls in modern diagrams is in the ratio 1 : 0.5 or 0.6.

When comparing this figure with that for the older diagrams it should be borne in mind that the reduction roll surface has not been so severely reduced as these figures tend to make it appear. Rather the specific surface of the breaks has been increased.

Roll Diameters

Corrugated rolls in European hard wheat semolina mills are almost entirely 9 in. in diameter. They have a very small milling zone and are thus good for semolina production (or conversely, they discourage flour production). Corrugated rolls of 10 in. in diameter are also used because they can be made longer and thus make possible a better utilization of space. The disadvantage of somewhat greater flour production is insignificant, and can be overcome by correcting the corrugation. Roll diameters greater than 10 in. should never be used for semolina milling, since the corrugations cannot be corrected as necessary without a deleterious effect on quality.

So that the productive capacity should be regular, it is necessary that the rotation speeds of rolls of different diameters should be suitable. For corrugated reduction rolls of 9 in. diameter, the normal speed is 275-300 r.p.m., and for 10 in. rolls 225-250 r.p.m. Smooth rolls should run at 250 r.p.m. for 9 in. diameter and 225 r.p.m. for 10 in.

As a basis for calculation one needs to know the peripheral speed of the rolls—particularly that of the fast roll. For corrugated reduction rolls in hard wheat semolina mills this should not exceed 3.5 metres a second. For rolls of greater diameter it is better from the point of view of product quality if the peripheral speed is kept below this figure. It would be better, for instance, to lay down a speed of about 3 metres/second for a 10 in. roll, if the roll length and mounting permit it. The volume capacity is thus naturally somewhat reduced, though this does not often affect the weight capacity.

If there is a surge of stock, on the other hand, it is better if the rolls are speeded up in order to avoid building up a cushion of stock between the rolls. In this connection we should mention the regulation of the feed rolls, which are an indispensable aid to regulating the reduction of hard wheat semolina. They alone, naturally, cannot bring about an absolute solution, since the rolls have to deal with stock in any case, whether it falls in a heavy stream or slips between the rolls in a thin curtain.

Differential Question

Closely connected with the speed at which the stock travels through the working zone of the rolls, after roll speed comes the question of differential. The reduction process depends on the fact that the stock is held on the slow roll while it is accelerated by the fast roll. The greater the difference in peripheral speed between the two rolls, which is theoretically transferred to the stock, the greater is the reduction. This should be as big as possible without giving rise to disadvantages, which are the production of too fine bran fragments through too vigorous milling and too great production of dunst and flour. With decreased differential better semolinas and coarser bran are produced; the amount of semolina produced is somewhat less, but the percentage of flour produced in the reduction passages is at the minimum. If the rolls are run with a differential of less than 1 : 2.5, which is considered to be the greatest differential for hard wheat semolina milling, the number of reduction runs necessary is increased. As we have seen, this increase is made insignificant by the recirculation of the stock. The smallest differential may be taken as 4 : 5, as used for the smooth rolls. At this differential the reduction in intensity of the grind is very noticeable.

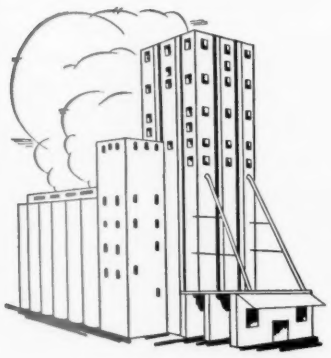
For example, the hourly capacity of a roller mill with a differential of 4 : 5 is higher than that of a roller mill with rolls of the same length and a differential of 1 : 2.5. The speed at which the stock is drawn between the rolls is higher, since the slow roll does not act so effectively as a brake. In order to keep sufficient feed between the rolls the feed should be made somewhat heavier, as the stock will not build up on the slow roll as it does at a higher differential. In the working zone the stock is gripped and accelerated by the fast roll, while the slow roll exercises a relative braking effect. The stock leaves the working zone at a speed that is theoretically the mean between the peripheral speeds of the two rolls:

$$Vst = \frac{Vsr + Vfr}{2}$$

The figure responsible for the effectiveness of the work of the rolls is that for relative speed, which is also calculated from the peripheral speeds of the two rolls. They are involved here as speeds in a clockwise and anti-clockwise direction that because of their direction have a mutual reducing effect. If we label the peripheral speed of the fast roll as positive and that of the slow roll as negative we get.

$$Vrel = Vf - Vs$$

This result gives an indication of the attainable milling capacity resulting from friction. The value can



How To Get A Grain Fumigant As Good As Weevil-Cide

For many years a typical competitive sales pitch has been, "We've got the same thing as Weevil-Cide — every bit as good — and our product is cheaper."

Despite the implied compliment to Weevil-Cide, we never especially cared for this comparison — mainly because it was never true.

It was never true in the past. It isn't true now. There've been some approaches in recent years. But we can still say no one has duplicated Weevil-Cide — nor, at equal dosage, Weevil-Cide results.

So — there's still only one way to get a grain fumigant as good as Weevil-Cide. Get Weevil-Cide.

For Information, Write: THE WEEVIL-CIDE COMPANY
1323 Union Avenue Kansas City 1, Missouri

alter for the same differential at different roll speeds.

As an example take a pair of 9 in. rolls turning at 300 and 250 r.p.m. with a differential of 1 : 2.5 and another similar pair with a differential of 4 : 5.

Differential	1:2.5		4:5	
Roll speed r.p.m...	300	250	300	250
Peripheral speed				
fast roll m/s	3.46	2.88	3.46	2.88
slow roll m/s ...	1.38	1.15	2.76	2.30
Stock speed m/s ..	2.42	2.01	3.11	2.59
Relative speed m/s	2.08	1.73	0.70	0.58

The speed of the stock gives a starting point for calculating the hourly capacity, while the relative speed gives a value that may be used as a scale to measure the frictional work that is done between the rolls.

The choice of differential can lead to other variations, however, particularly where a roll surface has been calculated short. If in the passage concerned there is no intensive reduction or grinding, a low differential should be chosen (2 : 3, 3 : 4, or 4 : 5). If the rolls are running faster than usual to avoid building up a cushion of stock under a heavy feed, a differential of 1 : 2.5 will result in a lot of bran powder being made. Here too the roll speeds can be maintained and the problem solved by using a smaller differential.

Similarly, the converse case can arise in a semolina mill—a reduction might receive a feed too small for its roll surface. Here a differential of 1 : 2.5 will permit the thinner feed to be used with a roll speed of 220-200 r.p.m.

In the case of reductions these are very little different from those of the breaks. The number of corrugations is made as suitable as possible for the granularity of the feed and varies between 7.5 per cm. (19 to the inch) for coarse semolinas and 12 per cm. (30 to the inch) for dunsts. The form of the corrugation is chosen so as to suppress flour production as far as possible and to keep the resultant particles as gritty as possible without at the same time cutting up the bran that is present. With durum wheats we are concerned with very thin-skinned varieties, which must be very carefully reduced—thin skin, hard endosperm. The hard endosperm means that where the corrugations are not well chosen the bran will be cut up. When the endosperm is broken up the newly formed particles will tear apart the bran attached to them without themselves becoming detached from it. Semolinas with adhering bran fragments are the result, and they are very difficult to purify. Corrugation angles of 30/65° for head reductions and 40/65° for the lower ones, working sharp to sharp, are to be recommended. Rolls running dull to dull are little used in the reductions, and only when an exceptionally branny stock is being handled.

As for the spiral, 10% to 12% is usual. The surface and lands of the corrugations are similar to those for flour mill rolls and do not differ from them in principle.

Sifters

These are arranged according to the roll surface and are calculated according to the coefficients for gross surface for wheat. For durum, the lower figures are chosen, because flour production is extraordinarily small and the flour sifting surface can be kept down. From the point of view of exact classifications on the sifters it is advantageous not to calculate too short, 0.8 to 1 square metre is sufficient for each 100 mm (4 in.) of roll surface, as there is little flour to sift out and the unused flour sifting surface comes in useful for preliminary classification. Reduction sifters are divided according to purpose into preliminary, semolina and flour sieves, according to the diagram. In smaller mills, where because of the small capacity fewer classifying sifters are available, the reduction sifters have to do the job of classifying as well, and special dunst sieves are provided for this purpose.

Charles M. Hutchinson

VICE PRESIDENT — Charles M. Hutchinson has been named vice president of Panogen, Inc., Ringwood, Ill. Since joining Panogen in 1950, Mr. Hutchinson has served as sales manager for the Illinois firm, a major manufacturer of seed treating materials and equipment. Mr. Hutchinson will continue his duties as sales manager.

Robinson "PNEU-SPOUT"

Highest Quality, Strength and Mobility at Lowest Overall Cost!

Sanitary—Non-Corroding Aluminum Alloy Units protect the wholesomeness of your product. They are rust-proof, corrosion-free and infestation is prohibited by interlocking junction pieces. In addition, there are no "dead spots" or linings to conceal infestation. Pneu-Spout is all metal spouting—no non-metallic parts to deteriorate.

Installed Four Times Faster—Supplied ready to assemble Pneu-Spout goes up four times faster than regular mill spouting. The lightweight aluminum is easier to handle and the patented junction design eliminates the need of large stocks of tubes, bends and elbows. A hacksaw, file and a screwdriver are the only tools required for installation. Unskilled labor can handle installation and do it in a fraction of the time required for other systems.

Mobility Feature Makes Pneu-Spout Reusable, ideal for temporary spouts. Here is a big, money-saving feature that makes Pneu-Spout so popular. Reconstruction or flow changes are easily made after original erection. Pneu-Spout can be dismantled and re-erected with ease and speed. This quick "take-down" and erection feature also saves time on installation or maintenance in areas of limited space. A minute's time is all it takes to remove and re-install Pneu-Spout sections.

Strong — Rigid — Choke-Free System — Rigidity and Strength are not sacrificed in the Pneu-Spout system. A fifteen foot wheat spout running at an angle of 30° from horizontal supported a 170 pound man without being disturbed. Pneu-Spout is run directly through floors and this does away with one of the main causes of chokes in mills that are wood spouted. Blowing of dust is eliminated also because Pneu-Spout flanges and connecting junctions are virtually air tight.

FREE—Pneu-Spout Booklet gives complete information on this new and better spouting. Write toDAY for your copy.

Carried in Stock for Immediate Shipment.

The DAY Company

Sold in United States by the DAY SALES Company

822 Third Avenue N.E., Minneapolis 13, Minn.

Representatives in Principal Cities

DAY SINCE 1881

EXCLUSIVE U.S.A. DISTRIBUTOR FOR PNEU-SPOUT

Quality
Satisfaction
Service

Are Synonymous with

SHUTTLE BRAND

SILK NYLON

Registered Trade Mark

Manufactured for more than a century by

TRIPETTE & RENAUD FILS MFG. CO.
Sailly-Saillisel and Paris (France)

Sole Importers for U.S.A. and Canada

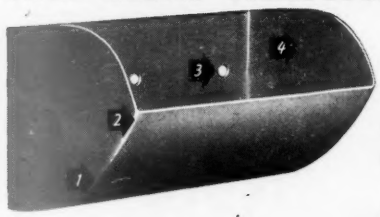
F. H. PAUL & STEIN BROS. INC.
235 Fifth Avenue New York 16, N.Y.
Phone: MU 4 (Murray Hill) 6371

Distributors

J. K. Howie Co. Minneapolis, Minn.
Capital Corrugating Co. N. Kansas City, Mo.

CHECKERBOARD ELEVATOR CO.
MILLING WHEAT • COARSE GRAINS • MILLFEED
Hard and Soft Winter Wheat
ST. LOUIS • KANSAS CITY • MINNEAPOLIS

First Choice Wherever Grain is Handled



Your jobber has them, or write B. I. Weller Company, 327 South LaSalle Street, Chicago 4, Illinois.

(1) The logarithmic curve design loads easier... dumps cleaner... permits high speeds.
(2) Scientifically formed lip aids in greater cup capacity.
(3) Bolt-hole placement gives better cup balance... saves belting.
(4) Hyperbolic sideboard ends permit greater load capacity without "slopping."

CALUMET CUPS

LIQUID FUMIGANTS

(Continued from page 1a)

period, the fumigant vapors were removed by operating the aeration system.

Gas sampling tubes were assembled in three cables, one down the center, one near the north wall and one near the south wall. Samples were taken at the surface, 15, 35, 55, 75, 95 and 115-ft. depths, and in the hopper.

Results of Test

The results are presented in Table 1. It may be noted that the concentration was heavier in the bottom half of the tank after the initial application by recirculation, and that the pattern did not change appreciably during the first 24 hours. When the vapors were recirculated at the 24-hour period, the distribution was improved. In the second 24 hours, the concentrations in the top half dropped again but remained about the same in the bottom half. A second recirculation improved the distribution somewhat. In the third and fourth 24 hours, the distribution remained fairly stable, and the third and fourth recirculations produced very little change.

Test H-2 was conducted during October, 1955, in an elevator tank at Sterling. In this test, the aeration system was not modified. The vapors were distributed by drawing them down through the grain mass until a satisfactory concentration was present at the bottom.

The tank was 105 ft. high and 26 ft. in diameter and contained 47,000 bu. wheat. The aeration system consisted of a half-round duct in the

Sample location and number	Galvanometer readings following the initial distribution						
	½ hour	2 hours	4 hours	8 hours	24 hours	48 hours	72 hours
	Units	Units	Units	Units	Units	Units	Units
North side							
1. Above load	12	7	4	4	10	6	4
2. 8 feet deep	90	108	116	75	40	14	8
3. 26 feet deep	82	102	114	108	66	46	40
4. 44 feet deep	94	88	74	60	48	37	30
5. 62 feet deep	90	70	60	44	34	24	20
6. 80 feet deep	70	55	46	33	26	14	16
7. 98 feet deep	34	34	26	18	22	21	8
8. In hopper	T	2	4	6	12	6	5
East side							
9. Above load	30	14	14	15	11	7	4
10. 8 feet deep	26	40	40	42	38	26	24
11. 26 feet deep	86	74	82	92	40	39	37
12. 44 feet deep	48	34	36	30	30	24	22
13. 62 feet deep	46	32	32	27	25	20	19
14. 80 feet deep	44	30	30	24	20	16	15
15. 98 feet deep	12	24	28	23	20	10	8
South side							
16. Above load	4	7	7	6	14	7	5
17. 8 feet deep	28	30	30	26	18	10	6
18. 26 feet deep	14	22	28	55	34	30	26
19. 44 feet deep	32	26	26	32	40	32	27
20. 62 feet deep	36	30	30	30	35	30	25
21. 80 feet deep	20	20	20	20	22	12	10
22. 98 feet deep	40	34	30	27	20	5	3
Center							
23. Above load	10	6	13	10	15	7	5
24. 8 feet deep	70	116	116	104	44	26	18
25. 26 feet deep	120	144	144	144	80	44	50
26. 44 feet deep	84	124	124	120	97	68	56
27. 62 feet deep	92	100	96	92	80	62	50
28. 80 feet deep	64	75	68	70	52	40	33
29. 98 feet deep	44	38	37	42	16	7	4

TABLE 3—Distribution of the vapors of a liquid fumigant in an elevator tank of wheat resulting from distribution of operating the aeration blower for 10 minutes at an air flow rate of 0.049 c.f.m./bu. in order to distribute the vapors from top to bottom of the tank.

Sample location and number	Galvanometer readings[1] during exposure period								
	½ hour	2 hours	4 hours	8 hours	24 hours	48 hours	72 hours	96 hours	14 days
	Units	Units	Units	Units	Units	Units	Units	Units	Units
Center									
1. 1 foot deep	112	77	73	64	39	13	0	0	5[2]
2. 10 feet deep	123	83	80	72	37	13	0	0	5
3. 20 feet deep	7	3	0	0	0	0	0	0	0
4. 30 feet deep	56	35	37	37	56	59	43	43	10
Midway east side									
5. 1 foot deep	56	32	29	29	33	19	0	0	5[2]
6. 10 feet deep	123	117	115	96	61	44	11	16	10
7. 20 feet deep	123	67	63	56	63	48	28	35	8
8. 30 feet deep	101	83	80	75	88	57	36	40	10
Wall west side									
9. 1 foot deep	131	131	127	61	51	32	8	16	5[2]
10. 10 feet deep	135	128	88	85	120	76	52	45	7
11. 20 feet deep	128	120	107	69	32	20	0	0	8
12. 30 feet deep	131	112	101	69	35	16	5	0	8
Headspace									
13	13	13	7	0	0	0	0	0	0[2]

1/In this instance, the galvanometer readings approximate ounces/1,000 cu. ft. based on a tentative calibration of the gas analyzer for this mixture.

2/Concentrations raised in surface layer and headspace to 12, 10, 12, and 10 units, respectively, by operation of blowers for 6 minutes in reversed position.

TABLE 4—Distribution of the vapor of a liquid fumigant in a large steel storage tank of wheat, resulting from recirculation for 15 minutes at an air flow rate of approximately 0.8 c.f.m./bu., test I-1.

Sample location and number	Galvanometer readings 1/ during exposure period							
	½ hour	2 hours	4 hours	8 hours	24 hours	48 hours	72 hours	13 days
	Units	Units	Units	Units	Units	Units	Units	Units
Center								
1. 1 foot deep	141	139	125	93	32	4	11	8 2/
2. 10 feet deep	155	125	120	117	99	61	57	26
3. 20 feet deep	75	59	36	36	24	24	23	19
4. 30 feet deep	101	97	72	75	80	59	77	34
Midway north side								
5. 1 foot deep	203	219	189	128	40	16	25	12 2/
6. 10 feet deep	75	97	91	80	28	80	80	30
7. 20 feet deep	267	267	267	240	171	88	83	8
8. 30 feet deep	139	114	91	96	171	112	115	44
Wall east side								
9. 1 foot deep	173	165	131	80	16	0	4	4 2/
10. 10 feet deep	123	117	91	75	67	43	53	30
11. 20 feet deep	80	91	77	69	43	37	48	30
12. 30 feet deep	116	88	72	64	40	29	37	26
Headspace								
13.	128	80	59	53	20	0	4	0 2/

1/In this instance, the galvanometer readings approximate ounces/1,000 cu. ft. based on a tentative calibration of the gas analyzer for this mixture.

2/Concentrations raised in surface layer and headspace to 24, 30, 30, and 24 units, respectively, by operation of blowers for 6 minutes in reversed position.

TABLE 5—Distribution of the vapor of a liquid fumigant in a large steel storage tank of wheat, resulting from recirculation for 19 minutes at an air flow rate of approximately 0.8 c.f.m./bu., test I-2.

Sample location and number	Galvanometer readings 1/ during exposure period					
	½ hour	2 hours	4 hours	8 hours	24 hours	11 days
	Units	Units	Units	Units	Units	Units
Center						
1. 1 foot deep	240	221	144	117	27	20 2/
2. 10 feet deep	209	80	83	80	64	20
3. 20 feet deep	13	0	0	0	0	0
4. 30 feet deep	267	280	267	261	187	20
Midway east side						
5. 1 foot deep	181	168	115	75	21	6 2/
6. 10 feet deep	181	176	219	229	141	28
7. 20 feet deep	133	173	142	147	128	26
8. 30 feet deep	193	168	155	213	125	20
Wall east side						
9. 1 foot deep	267	213	163	120	33	10 2/
10. 10 feet deep	173	227	160	135	123	22
11. 20 feet deep	267	168	208	171	107	22
12. 30 feet deep	224	176	252	213	171	36
Headspace						
13.	147	120	75	64	16	52/

1/In this instance, the galvanometer readings approximate ounces/1,000 cu. ft. based on a tentative calibration of the gas analyzer for this mixture

2/Concentrations raised in surface layer and headspace to 24, 24, 30, and 18 units, respectively, by operation of blowers for 6 minutes in reversed position.

TABLE 6—Distribution of the vapor of a liquid fumigant in a large steel storage tank of wheat, resulting from recirculation for 15 minutes at an air flow rate of approximately 0.8 c.f.m./bu., test I-3.

center of the flat floor of the bin, connected to a blower driven by a 7½ h.p. motor. The air flow rate was 0.04 c.f.m./bu.

The fumigant mixture used in this test was composed of 64.6% ethylene dichloride, 27.4% carbon tetrachloride, 5% ethylene dibromide and 3% sulfur dioxide. It was applied at a dosage rate of 2 gal. per 1,000 bu. wheat to the top surface of the grain as a coarse spray. The blower was started after the fumigant was applied and was operated for the length of time necessary for one air change in the tank, 14 minutes. The air from the blower was discharged to the outer air, and not recirculated in this instance. The exposure period was 96 hours.

Sampling tubes were assembled in three cables, one down the center one near the north wall and one near the south wall. Samples were withdrawn from the surface and at depths of 11, 29, 47, 65, 83 and 101 ft.

The results of vapor distribution are presented in Table 2. The distribution from the initial operation of the aeration system was quite good except at the 101-ft. depth. This was adjusted by gravity settling by the 24-hour period, but, oddly enough, the concentration fell again at this level after it had adjusted itself. It had been intended to redistribute the fumigant vapors every 24 hours by reversing the direction of the blower and forcing the vapors upward to the top. The distribution was so adequate that this was not necessary.

Test H-3 was conducted at Garden City in October, 1955, in the same tank used in a test at this establishment with methyl bromide. In this test also, the established aeration system was not modified, and the fumigant vapors were drawn down through the grain mass until a satisfactory concentration was obtained at the bottom.

The tank was 101 ft. high and 18 ft. in diameter and was equipped with a hopper bottom. The aeration system consisted of a half-round duct at the top center of the hopper connected to a blower driven by a 3 h.p. motor which produced an air flow rate of 0.049 c.f.m./bu.

The same fumigant mixture was used as in test H-2 at Sterling and was applied at the rate of 2 gal. per 1,000 bu. wheat. The fumigant mixture was sprayed on the top surface of the grain. Then the blower was operated for the length of time necessary for one air change, 10 min. The air from the blower was dis-

SUPERIOR CARBIDE TOOLS
For All Roll Corrugating
Economical Increased Output
CORRALLOY TOOL CO.
Minneapolis 7, Minn.

LET **DOTY** DO IT
If Your Lab Is Overloaded
Sanitation Analyses - Wheat and Flour
Doty Technical Laboratories
P. O. Box 7474
North Kansas City 16, Mo.

LEADERS IN THE MILLING INDUSTRY
specify the...
ENTOLETER® SCOURER-ASPIRATOR
. . . for the most efficient external and internal cleaning

Again, in 1956, more mills modernized their grain cleaning system by incorporating the ENTOLETER SCOURER-ASPIRATOR in their cleaning house flows!

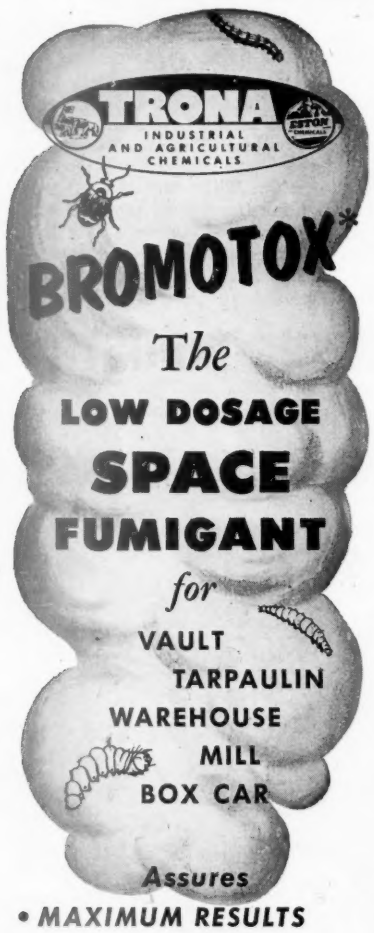
The ENTOLETER SCOURER-ASPIRATOR GRAIN CLEANING SYSTEM is the only continuous mechanical system of infestation control which reduces the fragment count on finished flour without increasing the loss to screenings.

The ENTOLETER SCOURER-ASPIRATOR...

- **is efficient, compact and especially designed to insure low maintenance and long service.**
- **provides the only CONTROLLED impact action which eliminates crease dirt without kernel damage!**
- **prevents customer-rejected flour from erasing your profits.**

ENTOLETER DIVISION
SAFETY INDUSTRIES, INC.
Formerly The Safety Car Heating and Lighting Co., Inc.
P.O. Box 904 New Haven 4, Conn.

ENTOLETER DIVISION is the United States Agent for Henry Simon Ltd., Stockport, England



- MAXIMUM RESULTS
- GREATER SAFETY
- MORE ECONOMY

Bromotox, a mixture of ethylene dibromide and methyl bromide, is an effective, safe and economical space fumigant. The stronger odor and lower dosage requirements of Bromotox result in greater killing power, increased economy and maximum safety. It is longer lasting, more penetrating and leaves no residual odor. Bromotox allows positive control of granary and rice weevils, Angoumois grain moth, confused flour beetle, Mediterranean flour moth, raisin moth, cheese mites and many other pests infesting grain, flour, rice, cheese and dried fruits. Available in cans packed twelve per case as well as 10, 50, 120 and 170 pound cylinders.

*TRADE MARK AP & CC

Other Eston Fumigants:

ESTON METHYL BROMIDE
The Versatile Fumigant

M-B-C FUMIGANT
Methyl Bromide with 2% Chloropicrin

A Product of
ESTON CHEMICAL DIVISION

American Potash & Chemical Corporation

3100 E. 26th St. Los Angeles 23, Cal.

Midwestern Distributor

FERGUSON FUMIGANTS

810 S. FLORISSANT ROAD
FERGUSON 21, MISSOURI

Sample location and number	Galvanometer readings[1] during exposure period						
	½ hour	2 hours	4 hours	8 hours	24 hours	48 hours	12 days
	Units	Units	Units	Units	Units	Units	Units
Center							
1. 1 foot deep	4	0	3	3	0	0	2[2]
2. 10 feet deep	176	124	86	70	50	38	16
3. 20 feet deep	86	86	74	63	48	42	12
4. 30 feet deep	200	200	196	200	82	70	10
Midway west side							
5. 1 foot deep	200	120	85	60	6	4	3[2]
6. 10 feet deep	64	56	50	50	60	60	32
7. 20 feet deep	100	116	160	134	70	44	14
8. 30 feet deep	120	186	180	200	90	86	7
Wall north side							
9. 1 foot deep	90	68	56	50	38	28	4[2]
10. 10 feet deep	90	66	64	50	38	36	24
11. 20 feet deep	80	64	56	48	40	35	10
12. 30 feet deep	80	54	48	44	44	46	10
Headspace							
13.	96	64	60	54	10	7	4[2]

1/In this instance, the galvanometer readings approximate ounces/1,000 cu. ft. based on a tentative calibration of the gas analyzer for this mixture.

2/Concentrations raised in surface layer and headspace to 10, 10, 16, and 12 units, respectively, by operation of blowers for 6 minutes in reversed position.

TABLE 7—Distribution of the vapor of a liquid grain fumigant in a large steel storage tank of wheat, resulting from recirculation for 20 minutes at an air flow rate of approximately 0.8 c.f.m./bu., test I-4.

charged into the outside. The exposure period was 72 hours.

Sampling tube cables were fastened to four temperature cables already installed in the tank, one down the center, and one about 5 ft. from the wall in the north, east and south quadrants. Samples were withdrawn from the headspace, the hopper, and at 8, 26, 44, 62, 80 and 98-ft. depths in the grain. The results are presented in Table 3. The initial distribution was very good except in the hopper. Since the vapors were still well distributed after 24 hours, original plans to redistribute them by reversing the direction of the fan were abandoned. The distribution remained fairly constant through the 72 hours except in the headspace and in the bottom at the 98-ft. depth.

It was concluded from this series of tests that the distribution of vapors of liquid fumigants could be accomplished by utilizing existing aeration systems either to recirculate the vapors, or to distribute them initially by drawing them down through the grain mass until an adequate concentration was obtained at the bottom. The distribution procedure necessitated a calculation of the time required to change the air content once, and a means of determining the vapor concentrations to guide the operation of the blower.

Four tests were made in tanks loaded with wheat at Neodesha in

Sample location and number	Galvanometer readings after recirculation					Galvanometer readings after redistribution
	½ hour	2 hours	4 hours	8 hours	24 hours	
	Units	Units	Units	Units	Units	Units
1. Headspace	127	91	96	55	19	76
2. 6 feet deep	107	105	55	49	46	
3. 12 feet deep	227	159	147	205	141	
4. 20 feet deep	216	150	134	97	78	
5. 30 feet deep	245	264	195	178	203	180

TABLE 8—Distribution of the vapors of liquid fumigant M-406 in a 10,000 bu. upright steel storage tank of wheat, resulting from recirculation for 4 to 7 minutes at an air flow rate of 0.18 c.f.m./bu. with a dosage rate of 1½ gal./1,000 bu., and redistribution after 24 hours, average of three tests, J-1, J-2 and J-3.

Sample location and number	Galvanometer readings after	
	6 hours	24 hours
	Units	Units
1. Headspace	32	44
2. 6 feet deep	184	52
3. 12 feet deep	184	196
4. 20 feet deep	168	166
5. 30 feet deep	76	88

TABLE 9—Distribution of the vapors of liquid fumigant M-406 in a 10,000 bu. upright steel tank of wheat, resulting from gravity penetration with a dosage rate of 1½ gal./1,000 bu., test J-4.

A. E. BAXTER ENGINEERING CO.

Designers and Engineers for Mills, Elevators and Feed Mills

1311-1315 GENESEE BUILDING BUFFALO 2, NEW YORK

FUMIGATE
With Full
CONFIDENCE

DAWSON 73

Low-Dosage
Full Strength
Spot Fumigant

GIVES FULL PROTECTION

Check These Important Points

✓ Dawson 73 is patented. It cannot be duplicated. (U. S. issues patents only on synergistic fumigant mixtures.) Which means that the special combination of ingredients has vastly superior insect killing power. The synergism of Dawson 73 is tested, proved and patented.

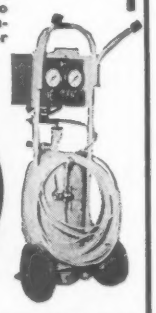
✓ Dawson 73 is the original low-dosage fumigant. Because it is powerful, less is needed and cost per treatment is lower.

✓ Dawson 73 is undiluted. It is sold at full strength. Percentage of active ingredients stated on label. Some fumigants do not state percentages. Watch your label. You get what you pay for.

APPLY EASILY EITHER METHOD

A Available in 2-inch shot can. One can equals knock-out strength of about a quart of conventional fumigant. Just punch and pour in fumigation ports now used. No handling bottles, wasted time, broken glass. No fumigant lost. Order case of 48 cans today.

B For large mills, use "Little Squirt" applicator. Two men can fumigate average mill in two hours. Cuts costs substantially. No equipment to buy. No initial investment. Ask for details.



DAWSON LOW-DOSAGE FUMIGANTS

FERGUSON FUMIGANTS

810 S. Florissant Rd.,
FERGUSON 21, MISSOURI
In Canada: Kipp Kelly, Ltd., Winnipeg and Toronto

September, 1954. Each tank was 96 ft. in diameter and 30 ft. high and contained more than 100,000 bu. wheat. The wheat temperatures ranged from 74 to 97 degrees Fahrenheit.

The aeration systems were identical. Each consisted of two halves, with a main duct running from one wall to the center, and with laterals to the tank periphery on each side, and a duplicate but separate system in the other half (Figure 1). A blower was connected to each main duct. The same pair of blowers was used on all tanks, and they were mounted on trucks and operated by power takeoff from the truck motor. Each blower had a capacity of approximately 10,500 c.f.m. under operating conditions, producing air flow rates ranging between 0.075 and 0.095 c.f.m./bu., depending on the size of load. A portable return duct was installed on each blower so that each aeration system was converted to a recirculation system. The fumigant vapors were recirculated in all four tests.

Tests I-1, I-2 and I-3 were replicates of each other. Gas sampling probes were inserted to depths of 1, 10, 20 and 30 ft. at three locations in the tanks at the center, west wall and center of east half.

A fumigant mixture containing 80% carbon tetrachloride and 20% carbon disulfide (by volume) was applied in each tank at a rate of 1½ gal. per 1,000 bu. The mixture was applied to the top surface of the grain as a coarse spray. From two to four hours were required to apply the fumigant because of the small pumps used. As soon as the application was complete, the blowers were started and operated until a high concentration was present at the floor level. This period ranged from 15 to 20 min. of blower operation.

The exposure periods varied from 11 days in test I-3, to 13 days in test I-2 and 14 days in test I-1.

Test I-4 was conducted in the same manner except that a fumigant mixture was used consisting of 10% acrylonitrile and 90% carbon tetrachloride (by volume).

At the end of the exposure period in each test, an attempt was made to redistribute the vapors by operating the blower in a reverse directon for a short period.

Distribution Satisfactory

The results for test I-1 are presented in Table 4. The initial distribution was satisfactory in spite of the long period required to apply the dosage of fumigant. The concentration in the headspace fell off rapidly and was zero by the 8-hour period. The concentration one foot below the surface declined after the second day. For some unexplainable reason, sample location 2 in the center at the 20-ft. depth, was low all through the test. When the blowers were operated in a reversed position for six minutes on the 14th day, the concentration at the surface and in the headspace was brought up to a satisfactory level.

The results for test I-2 are given in Table 5. Here again the initial distribution was satisfactory and remained that way, except in the surface layer at the center and east side, through the 13th day. The operation of the blower in reversed position raised the concentration in the headspace and surface layer to a satisfactory level.

The results of test I-3 are presented in table 6. The 20-ft. depth at the center was again an area of low concentration, but otherwise the distribution was quite satisfactory. The surface and headspace concentrations were brought back to a satisfactory level on the 11th day by the six-minute operation of the blower in reversed position.

The results of test I-4 with the acrylonitrile - carbon tetrachloride mixture are given in table 7. The original distribution was satisfactory, and remained that way except in the surface layer through the 12-day exposure. The concentrations in the headspace and surface layer were restored by operating the blowers to force the vapor up from the lower levels in the grain.

These tests demonstrated further that satisfactory distribution of the vapors of liquid fumigants can be obtained by recirculating them after application of the fumigant in liquid form to the grain surface. It was also shown that, as the vapors settled out of the surface layers, they could be redistributed by an upward air flow for a short time.

Upright Steel Tanks

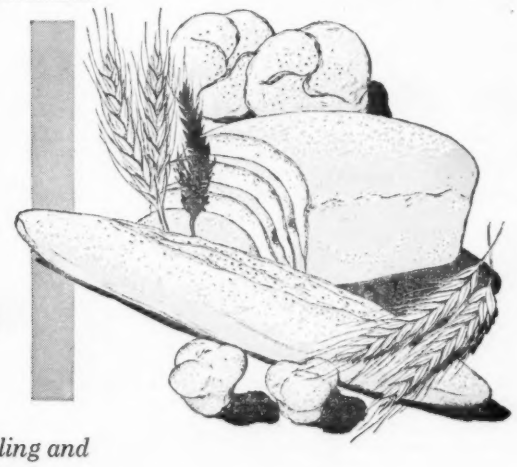
These tests were made during November, 1954, at Verden in eight 10,000-bu. upright steel tanks similar to those used for methyl bromide tests. Two series of tests were made, each using a different fumigant mixture, and in each series the recirculation method was compared with gravity penetration of the vapors.

Each tank was 32 ft. high, 21 ft. in diameter and was filled with wheat. The aeration system consisted of a central hub on the floor, 4 ft. in diameter with 16 laterals leading to the walls. The blower was equipped with a return duct to the headspace, and the air flow rate was determined to be 0.18 c.f.m./bu.

Gas sampling probes were placed to draw samples from the headspace

Advertisement

FLOUR FOR MAN'S BREAD*



A Brief History of Milling and Baking by SCIENCE WRITER

CHAPTER XV. *The Middle West Becomes A Grain Empire*

Pattern for Progress

The tide of western migration, which rose after the Revolutionary War, flooded on in the 1800's.

At mid-century, the central part of the United States was filling up with settlers who farmed the rich lands. The grains from these lands—converted to bread and meat—were basic to the growth of the nation.

With navigable rivers, the Great Lakes, and a growing system of roads and canals, with increasing mechanization of agriculture, and with large-scale automatic milling, the middle western states flourished.

Westward . . . Ever Westward

In 1840, wheat was grown mainly in Ohio, Pennsylvania, Maryland, and New York. That year, Ohio was the major wheat-producing state. Little was grown farther west.

As the center of population moved westward so did the center of wheat-growing—but at a faster rate.

Twenty years later, Illinois was the leader. Much wheat farming was done then in Indiana and Wisconsin. California was producing, and Minnesota was just beginning. Pennsylvania and Ohio were still important in the production picture.

Between 1840 and 1860, wheat was the first surplus crop of the new mid-western settlements north of the 36th Parallel. Where did this surplus go? Back to the eastern seaboard to feed the millions crowding into the cities there.

Power To Grind The Grain

Following historical custom, the milling industry moved with wheat production. In the United States flour milling was established at water-power sites. That practice continued for many years. As late as 1880, three-quarters of the milling power in Minnesota, New York, and Pennsylvania came from waterwheels. But Illinois and Missouri used four times as much steam as water power, and Indiana twice as much. A decade later, steam and water were about equal as a power supply for milling.

One important source of water power in the new grain empire was the Falls of St. Anthony where the Mississippi River drops about 45 feet. It was inevitable that this power would be put to work grinding grain. In 1854, a successful mill was established at the Falls and the growth of the Twin Cities was well begun.

Service To The Public

People eat *white bread* and other foods made from *white flour* because these wheat products so pleasingly satisfy basic cravings for good food. Homemakers like white flour for family cooking and baking. So do commercial bakers. They know that white flour bakes well and stores well.

Nutritionists, however, have one reservation about white flour and bread—they must be *vitamin and mineral enriched* because milling removes portions of the wheat containing nutrients needed by us all. Enrichment was adopted by millers and bakers more than 15 years ago. The important vitamins B_1, B_2, niacin, and the mineral, iron, are added to white flour or white bread during processing. The result: More healthful foods with outstanding nutritional organizations endorsing their wider use by an increasingly vitamin-conscious public.

A world leader in the production of pure vitamins by the tons at low cost, Roche is proud that it has been able to help bakers and millers serve the public so well.

This is one of a series of articles which is being published in professional nutrition and dietetic journals, and which will be widely distributed for educational purposes. Reprints of this and all previous chapters are available without charge. Write to the Vitamin Division, Hoffmann-La Roche Inc., Nutley 10, New Jersey. In Canada: Hoffmann-La Roche Ltd., 286 St. Paul Street, West; Montreal, Quebec.

The next chapter titled: "Improvements in Cleaning and Bolting" will be published soon.

*This is the title of a definitive history of milling by John Storck and Walter Dorwin Teague, published by the University of Minnesota Press at Minneapolis and copyrighted by the University of Minnesota. It is used with permission as a source of material for this series of advertisements.

Enriched with vitamins and iron for better nutrition

and from depths of 6, 12, 20 and 30 ft. in each tank. Insect samples were placed on the surface and at depths of 2, 4 and 12 ft. at two locations in each tank.

In tests J-1, J-2, J-3 and J-4, an experimental mixture known as Dow M-406, which contained carbon tetrachloride, ethylene dichloride and other ingredients was applied at the rate of 1½ gal. per 1,000 bu. In tests J-1, J-2 and J-3, the blower was started after the fumigant had been applied as a coarse spray to the top surface of the grain, and the vapors were recirculated until a satisfactory distribution was registered on the gas analyzer unit. This required from four to 7 minutes' operation of the blower. After 24 hours, the blower was operated for four minutes in reversed position to redistribute the vapors. In test J-4, the fumigant was applied to the grain surface and the vapors were distributed by gravity penetration. The exposure period was 48 hours.

In tests J-5, J-6, J-7 and J-8, a standard fumigant mixture was used composed of 29.2% ethylene dichloride, 63.6% carbon tetrachloride and 7.2% ethylene dibromide, by weight. In the first three tests, the fumigant was applied to the grain surface, then recirculated for 6 to 13 minutes until satisfactory distribution was obtained. After 24 hours, the vapors were redistributed by operating the blower in reversed position for four minutes. In test J-8, the fumigant was applied to the grain surface and the vapors were distributed by gravity penetration.

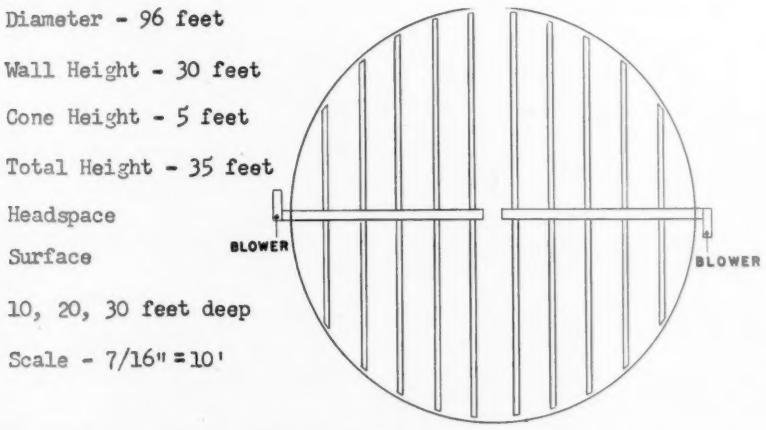


FIGURE 1—Diagram showing floor ducts of aeration system in large steel storage tanks.

Fumigant recirculated

Depth in grain	Granary weevil adults	Granary weevil eggs or larvae	Flour beetle adults
	Percent	Percent	Percent
1. Headspace	100	99.5	100
2. 2 feet deep	100	95.5	100
3. 4 feet deep	100	89.5	100
4. 12 feet deep	100	94.0	100
Fumigant distributed by gravity penetration			
5. Headspace	100	100	100
6. 2 feet deep	100	100	100
7. 4 feet deep	100	100	100
8. 12 feet deep	100	100	100

TABLE 10—Average mortality of test insects resulting from fumigation with liquid fumigant M-406 recirculated for 4 to 7 minutes at an air flow rate of 0.18 c.f.m./bu. with a dosage rate of 1½ gal./1,000 bu. and an exposure period of 48 hours, compared with distribution of gravity penetration, tests J-1, J-2, J-3 and J-4.

Sample location and number	Galvanometer readings after recirculation: ½ hour	2 hours	4 hours	8 hours	24 hours	Galvanometer readings after redistribution
	Units	Units	Units	Units	Units	Units
1. Headspace	108	88	61	59	35	80
2. 6 feet deep	200	200	184	176	158	
3. 12 feet deep	206	194	199	139	157	
4. 20 feet deep	165	135	157	151	144	
5. 30 feet deep	67	42	100	111	99	87

TABLE 11—Distribution of the vapors of a liquid fumigant in a 10,000 bu. storage tank of wheat, resulting from recirculation for 6 to 13 minutes at an air flow rate of 0.18 c.f.m./bu. with a dosage rate of 1½ gal./1,000 bu. and redistributed after 24 hours, average of three tests, J-5, J-6 and J-7.

Sample location and number	Galvanometer readings after: 5 hours	24 hours
	Units	Units
1. Headspace	8	0
2. 6 feet deep	38	10
3. 12 feet deep	50	80
4. 20 feet deep	54	40
5. 30 feet deep	no sample, probe broken	

TABLE 12—Distribution of the vapors of a liquid fumigant in a 10,000 bu. upright tank of wheat, resulting from gravity penetration with a dosage of 1½ gal./1,000 bu., test J-8.

Fumigant recirculated

Depth in grain	Granary weevil adults	Granary weevil eggs or larvae	Flour beetle adults
	Percent	Percent	Percent
1. Headspace	100	100	100
2. 2 feet deep	100	100	100
3. 4 feet deep	100	99.5	100
4. 12 feet deep	99.0	98.0	100
Fumigant distributed by gravity penetration			
5. Headspace	100	92	100
6. 2 feet deep	100	100	100
7. 4 feet deep	100	92	100
8. 12 feet deep	90.5	66.5	100

TABLE 13—Average mortality of test insects resulting from fumigation with a liquid fumigant recirculated for 6 to 13 minutes at an air flow rate of 0.18 c.f.m. with a dosage rate of 1½ gal./1,000 bu. and an exposure period of 48 hours, compared with distribution by gravity penetration, tests J-5, J-6, J-7 and J-8.

"WILLIAMS WAY SERVICE" SETS THE PACE!

Mill Supply Specialists Since 1905

We are specialists in supplying all the expendable items you need for efficient mill operation.

MOST ITEMS IN STOCK.
Ready to Ship Same Day
PHONE OR WRITE

☐ Swiss Silk and Nylon Bolting Cloth
☐ Wire Cloth—Tyler
☐ Bindo Edging—for Silk and Wire Sifter Cloths
☐ Sifter Stockings — Nylon and Canton Flannel
☐ Cloth Cleaners—Made-up
☐ Leather Belting—Graton & Knight Research
☐ Belting—Solid Woven Cotton and Rubber

Representing HART-CARTER and PRATER Lines of Equipment

H. R. WILLIAMS MILL SUPPLY CO.
Everything for Mill and Elevator
1320 MAIN STREET Phone Victor 2-3232 KANSAS CITY, MO.

ity penetration. The exposure period was 48 hours in all instances.

Insect Mortality Rate

The results of tests J-1 to J-4 are given in tables 8, 9 and 10. The average distribution at the end of the initial recirculation period was not very uniform, the concentrations being high at 12 ft. and deeper. The concentrations in the headspace and at the 6-ft. depth continued to decrease during the rest of the 24-hour period. The redistribution after 24 hours raised the concentration in the headspace to a satisfactory level. The distribution by gravity penetration showed a high concentration at the 6, 12 and 20-ft. depths at six hours, and at the 12 and 20-ft. depths at 24 hours. However, the insect mortality was complete at all locations in test J-4, but some granary weevil eggs or larvae survived at all levels where the vapors were recirculated.

The results of tests J-5 to J-8 are given in tables 11, 12 and 13. The average distribution at the end of the initial circulation period was good except at the 30-ft. depth, and this was partially corrected during the first 24 hours. The concentration in the headspace remained at a good level. The redistribution at 24 hours resulted in quite comparable concentrations in the headspace and at the 30-ft. depth. On the other hand, the centrations in the headspace and at from gravity penetration appeared to be quite low. After 24 hours, the concentration in the headspace and at the 6-ft. depth were very low.

Survival of test insects was low in the tests where the vapors were recirculated, occurring at the 4 and 12-ft. depths. Some granary weevil eggs or larvae survived in the headspace and at 4 and 12-ft. depths in test J-8.

It was concluded from these tests that, in this size of storage tank, the distribution by recirculation did not produce appreciably better insect mortality than did distribution by gravity penetration. The dosage rate used of each fumigant mixture appeared to be marginal for larvae of the granary weevil.

——BREAD IS THE STAFF OF LIFE——

Nabisco Conducts Third Conference On Sanitation

TOLEDO—The third annual company-wide sanitation conference of the National Biscuit Co. was held at the Commodore Perry Hotel, Toledo, with some 52 sanitary engineers, superintendents and foremen from 43 Nabisco bakeries, flour mills, and processing plants in attendance.

The conference was led by J. Lloyd Barron, Nabisco's director of sanitation. One of the highlights was an inspection of the company's Toledo mill on Front St., regarded as the largest soft-wheat flour mill in the world.

PAPER SACKS FOR MILLERS
The Chatfield & Woods Sack Co.
CINCINNATI, O.

ROLL GRINDING and CORRUGATING
Also NEW ROLLS for Sale
TWIN CITY MACHINE CO.
Minneapolis, Minn.

Fire-Damaged Wheat Given Trial as Feed

Although fire-damaged wheat is not particularly appetizing to pigs, it does retain a certain nutritional value. F. Whiting and L. M. Bezeau of the Canadian Department of Agriculture report that protein utilization in severely damaged wheat, although less than in normal wheat, is almost equal to that in wheat only slightly damaged by fire.

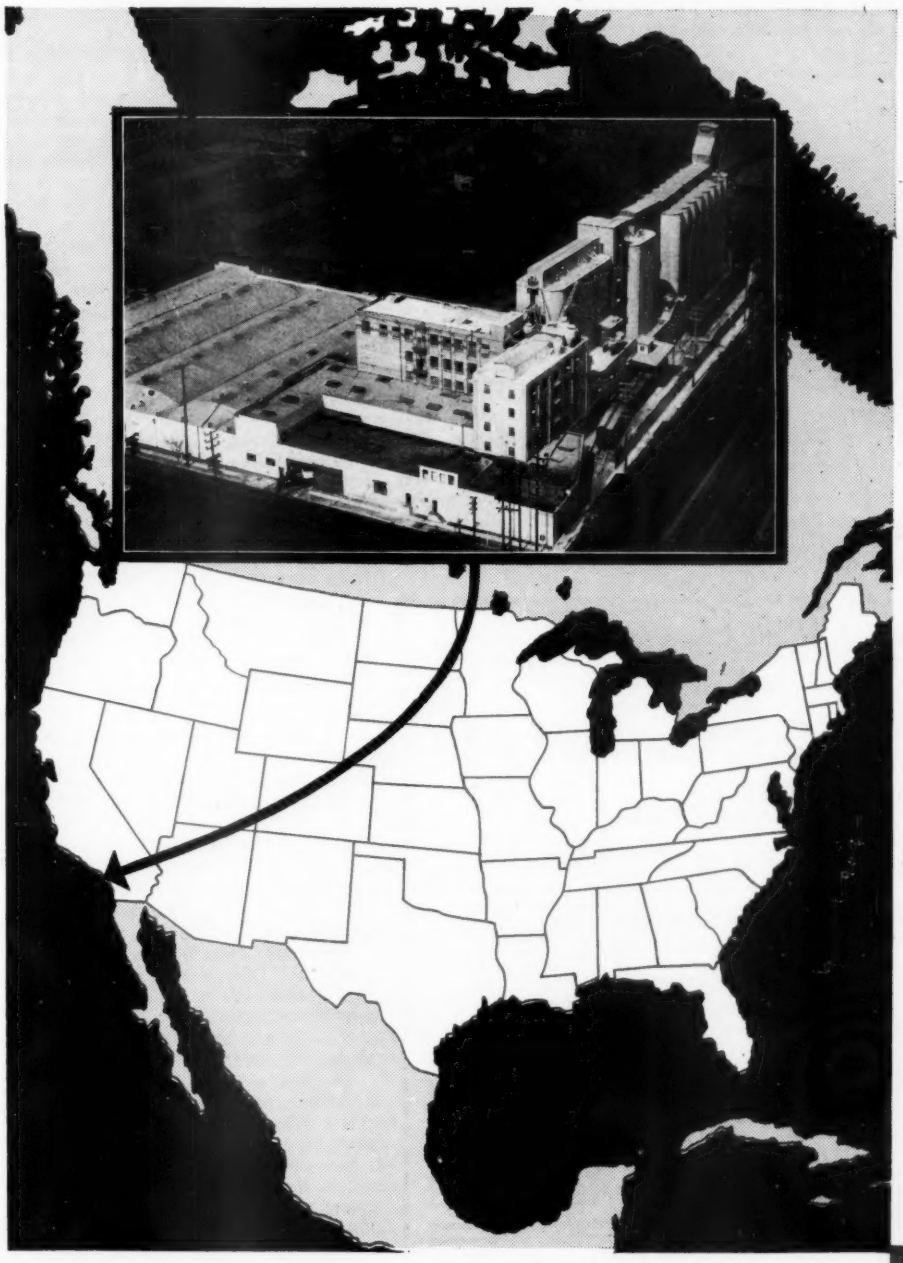
However, the digestible energy content of wheat severely damaged is considerably less than normal wheat and wheat slightly damaged. The over-all value of burnt grain as a feed will depend on the amount of fire damage and the amount of foreign material such as wood, glass and nails present in the grain.

In 1953 a quantity of wheat was obtained from a grain storage elevator that burnt at Picture Butte, Alta. This grain was put through a fanning mill to remove nails, glass, pieces of charred wood, fine charcoal dust and weed seeds. These materials amounted to 14% of the total weight. The most severely damaged wheat was then separated from wheat only slightly damaged by repeating the fanning mill operation with controlled wind and the use of various sieves. By chemical analysis and feeding trials the general value of this material was ascertained.

Rations consisting of burnt grain were so unpalatable to swine that a preliminary feeding period was necessary to accustom the pigs to the feed. Indications are that approximately 10 days are required for this purpose.

Each year fire destroys a number of grain storage elevators in North America rendering thousands of bushels of grain unfit for milling and processing purposes. Its use as a feed for livestock was one possibility but its comparative value with non-damaged grain has to be considered.

Start your profit program NOW



To be successful, a mill reconstruction or a new mill has to pay off fast. A Simon plant, custom-built for your needs and based on world-wide experience and a close study of U.S. conditions, is designed to do just that—efficiently, profitably at low cost.

Read what C. B. Capps, Executive Vice President and General Manager of California Milling Corp., says of their new Simon pneumatic mill—

"When we decided to build this new mill we realised that such a proposal could only be justified by improved extraction and economy of labour. We have already established quite clearly that we have achieved our aim. We are very proud of this mill, which has proved to us the advantages which can be gained by the latest milling developments."

HENRY SIMON LTD · Stockport · England

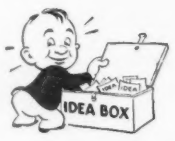
U.S. AGENTS : Entoleter Division, Safety Industries Inc., New Haven, Conn.

MANAGER FOR N. AMERICA : Eric A. Stanger, 5321 Chowen Avenue S., Minneapolis, Minn.

CANADIAN OFFICES : Room 901 Lumsden Buildings, Toronto 2, Ontario.
Room 345 Dominion Square Buildings, Montreal 2, P.Q.

Why not find out how the Simon system can aid your profit program? The Simon man will tell you all about it.

Worth Looking Into



New Products
New Services
New Literature

This reader service department announces the development of new and improved products, new services and new literature offered by manufacturers and suppliers. Claims made in this department are those of the firm concerned. Use the accompanying coupon to obtain the desired information.

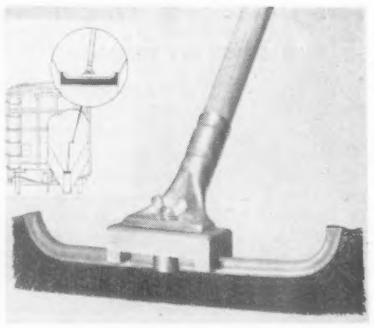
No. 5658—Crop Dryer

A new crop drying machine developed by the Shanzer Manufacturing Co. is going into full production this year, according to a company official. Known as the Shanzer Crop Dryer,

the new machine is described as a batch type unit capable of handling up to 375 bu. The dryer completely recirculates the grain during the drying operation, it is claimed. The dryer is of a thin column screen design to provide vertical flow of the grain. This system provides maximum "open" area, according to the announcement and thus subjects the grain to a greater amount of drying action. The thin columns also keep the grain near the warm air source. Secure more complete details by checking No. 5658 on the coupon and mailing it to this publication.

No. 3962—Bulk Car Brush

Bulk flour railroad cars can now be cleaned quickly, safely and efficiently of accumulations of caked flour which unloading techniques fail to remove, claim officials of the Fuller Brush Co. Their solution is a new specially designed brush of heavy, washable nylon. It is claimed to be non-susceptible to cracking, shedding and absorption of odors or other infestations and is firmly and evenly bonded to the metal brush back in a continuous Fullergript brush strip to form a sweeping tool 12 in. long with 1 in. exposed trim.



The brush has been designed for use inside "Air-Slide" or "Trans-Flo" "GACX" railroad cars. The clamp assembly designed by Fuller makes it possible for the brush strip to be removed and another put in its place. For detailed specifications and prices check No. 3962 on the coupon and mail it to this publication.

No. 5655—Scale

The Burrows Equipment Co. announces a new model all-purpose scale for grain grading. The announcement states: "The new model incorporates several design changes that increase the utility of the scale and make it faster and easier to use with increased accuracy. It is equipped with a poise which, by moving a lever, can be changed from a sliding type poise to a positive position notch type poise. The multiple beam graduations make the scale ideal for figuring weight per bushel tests, dockage and moisture percentages, weight in grams per moisture test and weight in ounces. The scale is available either with or without a pint measure." For further information check No. 5655 on the coupon and mail it to this publication.

Also Available

The following new products have been described in previous issues and information about them may still be obtained by jotting the appropriate number on the coupon and forwarding it to this magazine.

No. 3833—Package tying machine, B. H. Bunn Co.

No. 3834—Monthly formula service, Wilson & Co.

No. 3835—Stainless steel scoops, pails and funnels, Star Stainless Screw Co.

No. 3836—Revolving cake stands, Cake Stand Manufacturing Co.

No. 3837—White polyethylene coated board, Gair Cartons Division, Robert Gair Co.

No. 3838—Island type bakery display stand, Maine Manufacturing Co.

No. 3840—Water conditioner, Packard Manufacturing Co.

No. 3841 — Display case catalog, Maine Manufacturing Co.

No. 3842—Sugar facts report, Refined Syrups & Sugars, Inc.

No. 3843—Bulk trailer, Vacu-Veyor Division of Vacu-Blast Co., Inc.

No. 3844—Lubricant, Warren Refining & Chemical Co.

No. 3845—Topping, S. Gumpert Co.

No. 3847—Upright freezer, Federal Refrigerator Manufacturing Co.

No. 3849—Stabilizer, Seaplant Chemical Corp.

No. 3850—Sweet dough base, H. C. Brill Co., Inc.

No. 3851—Bulk flour bulletin, Fuller Co.

No. 3852—Freezer for storage or self-service use, H. C. Rhodes Bakery Equipment Co.

No. 3853—Sweet dough stabilizer, H. C. Brill Co., Inc.

No. 3854—Truck letters, Plasticles Corp.

No. 3855—Cream filling, S. Gumpert Co.

No. 3856—Toppings and fillings, Max Ams Co.

No. 3857—Edible oil filter, Industrial Filtration Co.

No. 3858 — Automatic doughnut making, Doughnut Corporation of America.

No. 3859 — Teflon tape, United States Gasket Co.

No. 3860—Utilities cost booklet, Rateonics Corp.

No. 3861—Banana baking recipes, Banamash division of the Catz American Co., Inc.

No. 3862—Pan Service, Chicago Metallic Manufacturing Co.

No. 3863—Film sealer, Cleveland Heat Sealing Equipment Manufacturing Co.

No. 3864—Bakery fixtures, Maine Manufacturing Co.

No. 3865—Depanning service, Mallet & Co., Inc.

No. 3866 — Electronic controls, Fielden Instrument division, Robertshaw-Fulton Controls Co.

No. 4056—Bulk flour weigher, Toledo Scale Co.

No. 4059—Self-powered feeder, 200-2,000 lb. per minute, Wallace & Tiernan Inc.

No. 4060—Motor selector guide, Reliance Electric & Engineering Co.

No. 4061—Nylon breather unit for venting Airslide cars and other bulk flour transports, Fuller Co.

No. 4062 — Single roll crusher, Sprout, Waldron & Co., Inc.

No. 4063—Research bulletin, Allis-Chalmers Manufacturing Co.

No. 4064—Wire screen folder, Cleveland Wire Cloth & Manufacturing Co.

No. 5502—Sprays and spray concentrates for grain protection, Larvacide Products, Inc.

No. 5561—Attrition mill, Strong-Scott Manufacturing Co.

No. 5596—Fire detection system, Seedburo Equipment Co.

Send me information on the items marked:

☐ No. 5658—Crop Dryer
☐ No. 3962—Bulk Car Brush
☐ No. 5655—Scale

Others (list numbers) .....

NAME .....

COMPANY .....

ADDRESS .....

CLIP OUT — FOLD OVER ON THIS LINE — FASTEN (STAPLE, TAPE, GLUE) — MAIL

FIRST CLASS PERMIT No. 2 (Sec. 34.9, P. L. & R.) MINNEAPOLIS, MINN.

BUSINESS REPLY ENVELOPE
No postage stamp necessary if mailed in the United States

POSTAGE WILL BE PAID BY—

The Northwestern Miller

P. O. Box 67,

Reader Service Dept. Minneapolis 1, Minn.

——BREAD IS THE STAFF OF LIFE——

USDA Group Asks Widened Research On Feeds, Forages

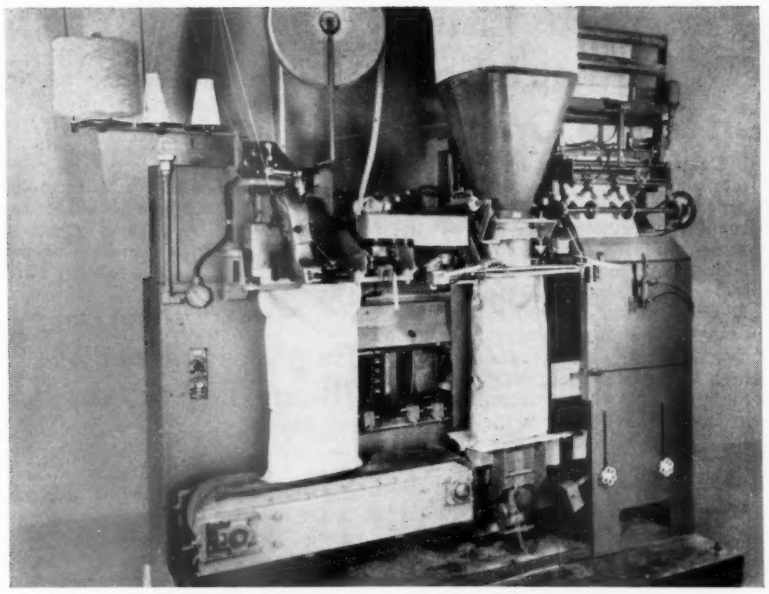
WASHINGTON—Better control of insects that attack forage crops and pests that infest stored grains is among the high priority needs of research cited by the U.S. Department of Agriculture's Feed and Forage Research and Marketing Advisory Committee.

These and other research proposals were considered by the committee at its annual meeting in Washington recently. The committee is composed of persons outside USDA selected to review USDA's research program on feeds and forage and to advise the secretary of agriculture on research needs in this field.

The group elected as its chairman, E. G. Cherbonnier, feed consultant, St. Louis, who succeeds Elwood L. Chase, Buffalo. R. M. Bethke, vice president of Ralston Purina Co., St. Louis, was elected vice chairman.

Important lines of work were cited by the committee in the fields of production, utilization and marketing research.

Under the category of feed and forage production, high priority recommendations included expanded research on insect physiology and toxicology, including work on the nature and action of insecticides, repellents and attractants, and studies on why some insects develop resistance to insecticides.



New Automatic Packer for Open Mouth Multiwalls

Automatic Packer for Open Mouth Multiwall Paper Bags Announced

NEW YORK—The development of a fully automatic packer for open mouth multiwall bags has been announced by the St. Regis Paper Co.

The company said that its new "VredOMatic" packer makes it possible to fill open mouth multiwalls and sew them closed with or without boundover tape automatically. The packer, the announcement said, is used in combination with a St. Regis pre-weighing scale.

The packer positions, opens, fills, closes and sews, with or without tape, open mouth bags holding 25 to 125 lb. of granular, free-flowing materials such as feeds. It can also handle semi-free flowing materials with auxiliary equipment.

"A substantial saving is possible since the open mouth bags can be filled and closed automatically," St. Regis said. "The system provides accurate weights at a speed which matches or exceeds the production of most scales used in conjunction with open mouth packers. Bag closures are tight and accurate.

"Prior to the development of this packer, it has been necessary to use at least two men on most open mouth multiwall packaging lines to fill and sew the bags.

"The VredOMatic is completely automatic. The bag is moved under the filling spout and through the sewing machine automatically, thus eliminating the need for two men at these positions. One man is needed to keep the machine supplied with empty bags, tape and thread for the sewing machine. It is expected that this man can handle two or more adjacent machines."

Production capacity is said to be 6 to 12 bags per minute, depending upon the material, bag capacity and proper installation.

St. Regis said the packer has been under development for about two years, undergoing tests in the company's development laboratories. Also, several prototype machines have been built and field-tested in customers' plants.

Operation of the packer was described by St. Regis as follows:

Empty multiwall paper bags are placed in the bag feeder. The bags are pulled out of the feeder rack one at a time by a power roller which drives the bags down to the opening, filling and closing level, and registers them in the bag indexing position. The bag is then positioned accurately so the top of the bag will be properly located.

As the bag is advanced, a top opening device parts the leading gusset, holds the ply open for entry of the clam-shaped filling spout unit which is then lowered into the bag. When the spout is all the way into the bag, it opens, thus opening the top of the bag. In the open position, V-belts are pulled tight around the top of the bag, sealing it. V-belt pulleys serve to clamp the bag at the gusset.

The material to be packed has been pre-weighed to the correct weight, and is held in a scale bucket. As the bag advances toward the filling position, the charge is released from the scale bucket and reaches the bag just after it has been opened.

A bag settler at the filling station serves to lower the level of the material in the bag, making possible a shorter filling time and the use of a smaller bag.

When the bag is filled completely, the filling spout moves out of the bag, allowing the V-belts to draw the top of the bag together in a straight line. The bag top is then trimmed slightly to insure a firm top and good sewing, tape is applied, and the bag sewed. The bag is then advanced to a take-away conveyor or chute.

Fuller Company Starts Expansion of Plant At Catasauqua, Pa.

The Fuller Co. has begun a 50% expansion of its manufacturing facilities at its headquarters at Catasauqua, Pa. The expanded plant will be completed and ready for production by early summer.

According to a company spokesman, the expansion was inaugurated to meet the company's increasing business in its regular lines; also to produce the fan and blower lines of Lehigh Fan & Blower Co., which Fuller recently acquired. Lehigh is now a division of Fuller.

In addition to its Catasauqua plant, Fuller has plants in Manheim, Pa., and Compton, Calif. Fuller equipment is also manufactured in England, Spain, France, Germany and Japan. Branch offices are in Chicago, San Francisco, Los Angeles, Seattle, Kansas City, Mo., and Birmingham, Ala.

The company is a subsidiary of General American Transportation Corp.

MILL COGS

We make ALL kinds. Specialize in "Ready Dressed" cogs which are READY TO RUN the moment driven and keyed. Write for circular "DW" and instruction sheets free.

The N. P. Bowsher Co., South Bend, Ind.

EMPTY CARS—
FASTER—SAFER

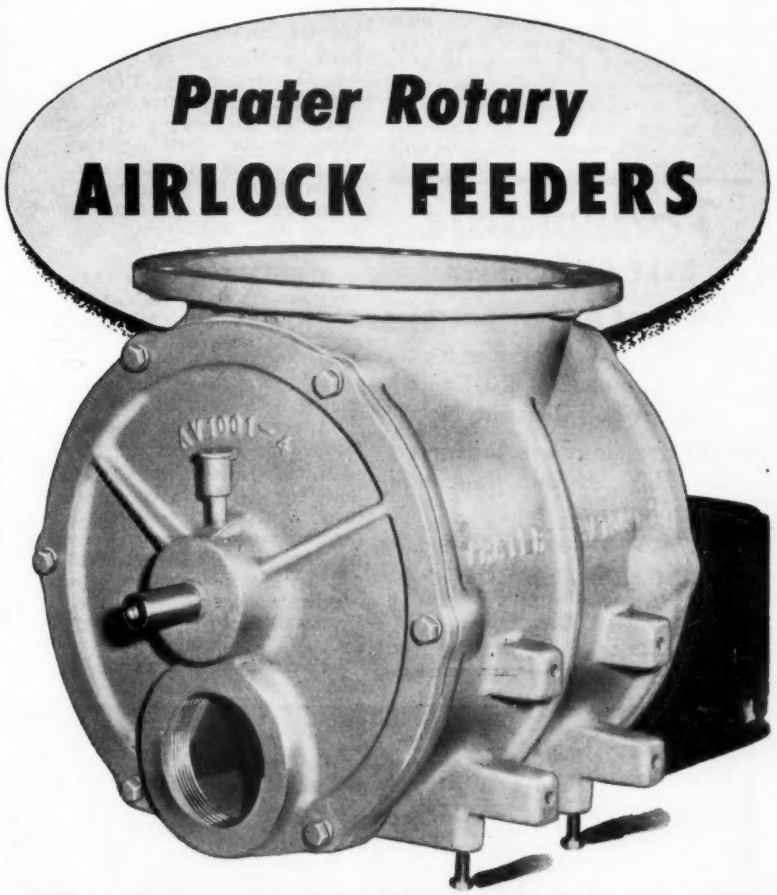
BROOKS CONVERSION KIT
Eliminates the old fashioned, dangerous rope and weight system of operating the tripping mechanism of automatic shovel machines.

BROOKS SHOVEL HOOKS
Save time, money, accidents. Chain can't drop out of hook. Yet hook opens easily with slight hand pressure.

Write for FREE Folder and Prices

The FOSTER & FELTER Company
1908 Grand Avenue, Kansas City 8, Mo.

Prater Rotary
AIRLOCK FEEDERS



The Greatest Value of them all!

- **FOR DUST CONTROL**
- **VOLUMETRIC FEEDING**
- **PNEUMATIC CONVEYING**

A complete line of expertly built equipment available in four sizes, three styles—with a variety of rotor combinations to meet the exacting needs of the industry, from low pressure dust control to high pressure pneumatic conveying.

You'll marvel at the simple, straight forward design and the rugged, dependable construction embodied in every Prater machine.

WRITE TODAY FOR RECOMMENDATIONS ON THE FEEDER BEST SUITED TO YOUR SPECIFIC NEEDS.

PRATER
Foremost Builder of Rotary Airlocks
PRATER PULVERIZER COMPANY
1519 SO. 55th COURT • CHICAGO 50, ILL.

AACC Group Told Of Studies Made In Protein Field

MINNEAPOLIS — "One of the most vital needs today in protein chemistry is data which can be applied to normal—not special—conditions," said Dr. Max O. Schultze, professor of agricultural biochemistry at the University of Minnesota to cereal chemists here Feb. 15.

Dr. Schultze spoke before the Feburtry luncheon meeting of the Northwest Section of the American Association of Cereal Chemists. He gave credit to scientists who have conducted amino acid studies under controlled conditions, particularly low protein diets, but said there is a "big gap" in the work.

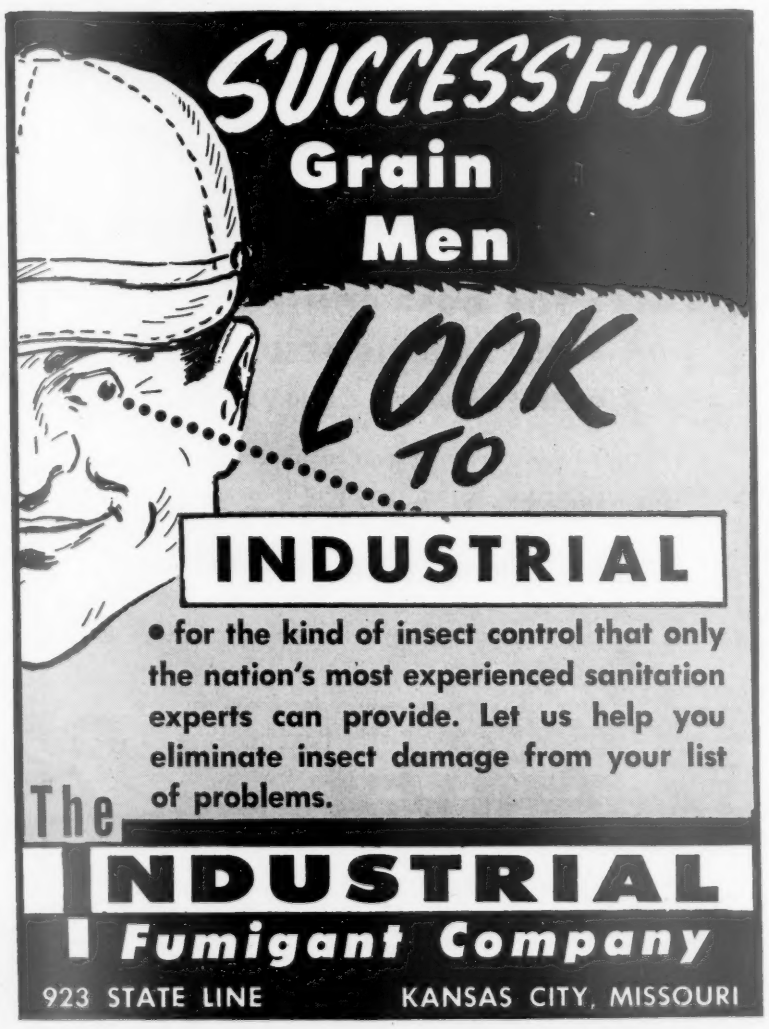
Dr. Schultze's talk was centered on the biological value of protein. He termed protein chemistry "essentially the study of amino acids," and backgrounded his remarks by reviewing some of the concepts propounded on the subject. "How many of these experiments into the dietary effects of essential amino acids can be applied and interpreted under normal conditions?" asked Dr. Schultze, after remarking that many experiments offered by research were conducted under special conditions. He said that this "lack" of data gathered under normal conditions is the "big gap" in the field.

"One of the newest concepts of biochemistry the last few years has been the emphasis on the nutritional value of proteins," said Dr. Schultze, as background for his talk. He covered the concept of continuous breaking down and replacement of old protein by new in the organism. He explained the processes of protein digestion in the intestine and of amino acid absorption into the organism.

"These are processes over which we have little or no control," said Dr. Schultze. He explained to the group the need of the organism for 8 or 10 essential amino acids to maintain nutrition, but pointed out that these 8 or 10 are not necessarily all the amino acids needed to sustain life.

One of the reserve gaps which Dr. Schultze would like to see filled has to do with a wide variance in nitrogen loss during the digestive and absorption process. He cited studies in which the wide variance of nitrogen loss was not explained. Again, said Dr. Schultze, these experiments were made under special—not normal—conditions for the organism.

Talismanic
BELT DRESSINGS
Specialized for Your Industry
For Mills, we recommend . . . Belt Clinch No. 2 (liquid) and Bar Belt Dressing No. 3.
These dressings are preferred by 75% of our flour mill customers.
WRITE FOR GENEROUS SAMPLES
JOHN C. CHAMBERS & CO.
1827 N. LeClaire Ave.
Chicago 39, Ill.



Precautions Listed To Prevent Losses In Stored Grain

Losses in stored grain can be serious unless precautions are taken to prevent the entrance of moisture, and regular inspections made to see that the grain is in good condition.

Following a survey of typical grain storages in Western Canada, Dr. H. E. Gray, entomologist for the Board of Grain Commissioners, suggests the essentials for safe storage include a high well-drained site for the storage building, with a pronounced slope for at least 6 to 8 ft. from the ouside of the building to carry away the water that falls on the roof. Sufficient ditches should be provided to carry the water away from the vicinity of the building. Weeds and litter should be removed to avoid trapping snow in close contact with the building.

Floors are important. The best type of storage building, and now being built by many elevator companies, has concrete piers or substantial sleepers on the ground, on which 2 x 10 or 2 x 12 joists are placed with 12 in. centers. On these a sheathed or plywood floor is laid. This provides ventilation under the building and the stored grain will not be damaged by ground moisture rising through the floor. If the floor is poor, serious damage may occur at the bottom of the grain where detection is difficult by ordinary sampling methods until a considerable amount of grain is involved.

Ventilation Essential

Sufficient ventilation is necessary above the grain if it is to be stored safely. This can be done by installing ventilators in the ends as well as the peak of the building. End ventilators should be liberal in size, and all ventilators so constructed that driving rain or snow cannot enter the building. Where grain is stored in warm weather, ventilation is extremely important. When outside temperatures fall there is a movement of warm air from the grain mass to the upper surface carrying moisture with it. Without sufficient ventilation there will be extensive condensation in the upper layers of grain likely to lead to insect and mold infestation and spoilage. Grain stored in winter months tends to remain cold and insects cannot breed in cold grain.

It is essential to take probe samples and temperature readings regularly in the stored grain throughout the storage period. If condensation occurs it may be necessary to rake or shovel the surface to break up or prevent the formation of a crust.

Only dry grain should be stored where it must be held for a long period. Even a single load of "tough" grain may be enough to start trouble. It is also best to store only clean or cleaned grain. Insect pests thrive much better on dockage than on sound whole grain. If fumigation is necessary to control insects, it is much easier to kill them in clean grain than in grain containing a lot of foreign material or broken kernels.

In planning on-farm grain storage, the U.S. Department of Agriculture advises weighing the costs of adding or remodeling storage structures against benefits and returns.

Weighing costs against returns may be difficult, since benefits from adequate storage depend on the particular farm situation. However, USDA economists say there are certain considerations that apply generally.

Initial cost of the structure is an important consideration, but grain storage costs should also be taken into account. Grain storage costs include interest, taxes, extra handling costs, pest control, shrinkage and quality loss.

For maximum efficiency and use, farm storage should be adapted to the operator's program, suited to his harvesting methods and adapted to the building site. Careful consideration should be given to dual-purpose buildings that add flexibility to a farm operation.

——BREAD IS THE STAFF OF LIFE——

Bagpak to Construct Illinois Sack Plant

NEW YORK—Construction of a new multiwall paper shipping sack plant to be built by the Bagpak Division of International Paper Company in Litchfield, Ill., will begin in early spring, it was announced by A. A. Scholl, division manager.

Located in an eight-state agricultural and industrial area, the new plant will manufacture sewn and pasted bags for packaging such diverse commodities as animal feeds, fertilizers, cement and miscellaneous dry chemicals.

Mr. Scholl said that the plant will be located on a 20-acre site adjacent to the New York Central Railroad right of way, and will occupy 60,000 sq. ft. Bagpak will employ approximately 200 when it reaches full operation late in 1957.

——BREAD IS THE STAFF OF LIFE——

S. Howes Co. Begins Second Century

SILVER CREEK, N.Y. — The S. Howes Co., under the leadership of Alexis C. Barbeau, Jr., president and general manager, has started a second century of operation.

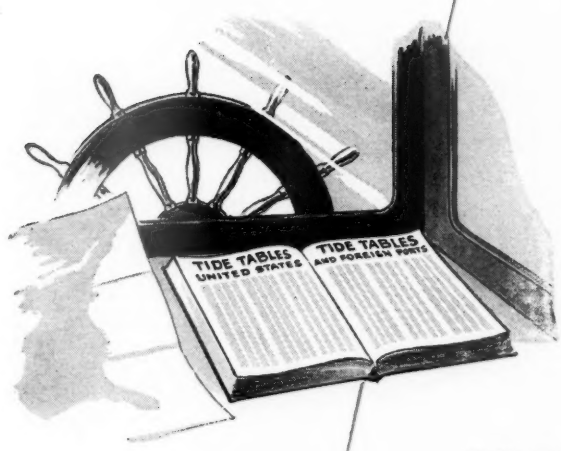
At its home town, Silver Creek, N.Y., 300 persons recently attended a banquet commemorating the company's 100th anniversary as one of the oldest and largest manufacturers of grain processing machinery.

The company's "Eureka" line was founded in 1856 by Simeon Howes. In 1896, Louis E. Barbeau, grandfather of the current president, purchased company interests from Howes' heirs. A. C. Barbeau, Jr., now in his 11th year as president, is the third member of the family to direct the firm.

As a result of a 3-way expansion of plant, machinery and markets, the firm's products are marketed in all 48 states and in many nations abroad.

ANNIVERSARY — The above scene was photographed at a recent anniversary civic banquet marking the 100th anniversary of the founding of the S. Howes Co., Silver Creek, N.Y. Shown at the left is A. C. Barbeau, Jr., president and general manager, and at the right is Frederick A. Feltz, supervising principal of the Silver Creek Central School.

Reliability



Reliance on the accuracy of tables predicting the periodic ebb and flow of the tides guides shipping throughout the world.

Reliance on proved performance is important in the flour treatment business too. Equipment must always be ready to operate efficiently and unfailingly, and service must be prompt and dependable whenever and wherever needed. Wallace & Tiernan offers you both — the best in equipment developed in over a third of a century of experience in the milling industry, and the most reliable service because of its integrated manufacturing, research, and service organization. A competent and extensive field organization is always on call, and offers a regular inspection service to prevent costly shut-downs.

Because *you* can rely on Wallace & Tiernan for the most dependable flour treatment equipment and service available, *your customers* can rely on you.

DYOX
for flour maturing

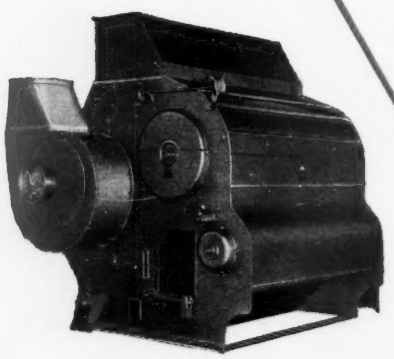
NOVADELOX
for a whiter, brighter flour

N-RICHMENT-A
for uniform enrichment

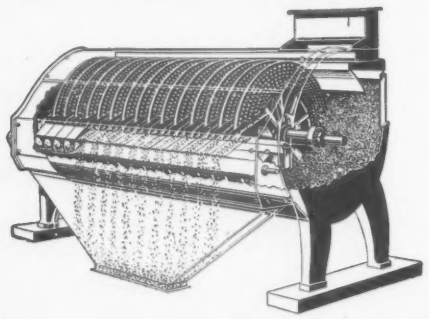
NOVADEL FLOUR SERVICE DIVISION
WALLACE & TIERNAN INCORPORATED
BELLEVILLE 9, NEW JERSEY
REPRESENTATIVES IN PRINCIPAL CITIES

"Dyox" "Novadelox" and "N-Richment-A" Reg. U. S. Pat. Off.

The *RIGHT* Cleaning Machines for *YOUR* Requirements!



Carter Scalperator
Scalping and Aspirating

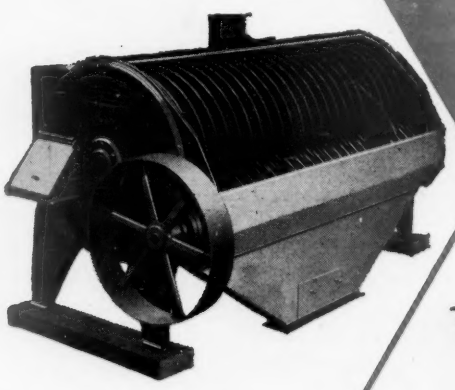


Carter Disc-Oat Separator
Length Separation

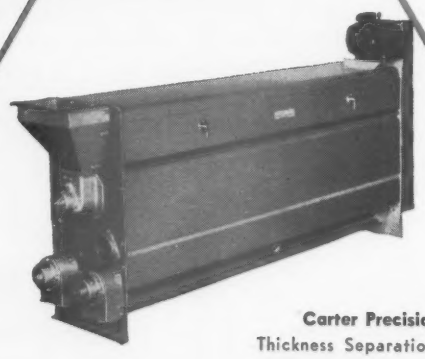
Carter Millerator
Refined Scalping, Screening and Aspirating

Balanced Cleaning

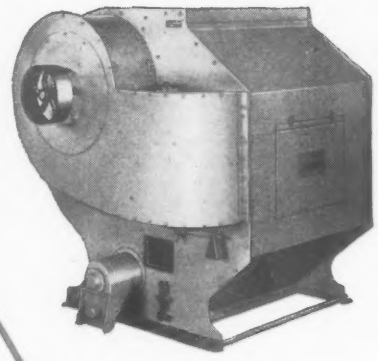
Hart-Carter grain cleaning machines provide the right type of separation in the right place —balanced cleaning. Thorough cleaning is necessary and profitable; overcleaning is wasteful and expensive. Hart-Carter machines combine efficiency with economy of operation . . . capacity with compactness. In the extensive Hart-Carter line there are machines to fit your specific requirements. Write for complete information today.



Carter Disc-Seed Separator
Length Separation



Carter Precision Grader
Thickness Separation and Grading



Duo-Aspirator
Aspirating

HART-CARTER COMPANY

673 NINETEENTH AVENUE N. E. MINNEAPOLIS 18, MINNESOTA